

GROUND INVESTIGATION REPORT

PROPOSED REDEVELOPMENT AT:

38 NEW LANE, HAVANT, HAMPSHIRE PO9 2ND



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APPENDIX C

Groundsure Screening Report, Ref. SF-5665919, dated December 2018

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Havant Borough Council, 23 Jan 2019, letter ref. GEN/18/01229

APPENDIX E

Interpretive Report on Ground Investigation, 38 New Lane, Havant; Structural Soils Ltd Project No: 734244, dated February 2019

1.0 INTRODUCTION

It is proposed to demolish the existing warehouse building currently occupying the site, and to construct two commercial buildings (comprising twelve new individual units) together with an access road, hard standing areas and limited landscaping.

In connection with the proposed works, Soil Consultants Ltd (SCL) were commissioned by the project engineer (Powell Tolner & Associates Ltd), on behalf of the client (Kingsbridge Estates Ltd Pension Scheme) to carry out an additional ground investigation, to include the following elements:

- ✚ Review of an existing Phase 1 Environmental Site Assessment, dated October 2016 (by Vertex Group Inc), and a preliminary/limited 'Interpretive Report on Ground Investigation' Project No: 734244, dated February 2019 (by Structural Soils Ltd [SSL])
- ✚ Undertake an additional Phase 2 intrusive investigation
- ✚ Advise on ground bearing pressures, foundations and floor slabs
- ✚ Contamination risk assessment and revised conceptual model

This report summarises the findings and conclusions of the existing Phase 1 research and the Preliminary Risk Assessment by Vertex, together with the preliminary site investigation by SSL. It then describes the additional investigation undertaken by SCL, gives a summary of the ground conditions encountered and discusses foundation options. An environmental appraisal is then provided, including a site-specific contamination risk assessment and revised conceptual model. The earlier reports should be read in conjunction with this report.

2.0 SITE DESCRIPTION

The site is located within a large industrial estate east of New Lane in Havant, at approximate NGR 472650E 107525N, about 1.5 miles north-east of Havant town centre. It forms a roughly square plot of land measuring about 100m x 100m. New Lane forms the north-west boundary, Stanbridge Road lies to the south-west and Downley Road to the south-east. Residential housing is present to the west beyond New Lane, which is edged by trees and a watercourse. A large gas holder, operated by SGN, is present immediately north of the site and is situated within a cutting approximately 1m deep. Bordering the site to the north-east is a Veterinary Referral Clinic.

At the time of writing the site comprised a large commercial building, located centrally on site, which was divided into several units, with a further smaller unit present in the north-western corner. Hardstanding was present to the north-east and south-west of the main building, and grassed landscaped areas to the south-east and north-west. The hardstanding to the north-east was used for car parking and is predominantly asphalt-surfaced with gravel surfacing at the north-western end. A strip of sloping ground, roughly 1.5m high, is present along the north-eastern site boundary. This previously contained a row of trees, but the majority have been removed with only stumps now remaining.

The grassed area in the south-east of the site is approximately 1m higher than the level of the building and is similar in elevation to that of the adjacent road to the east. The area is overgrown at the southern end.

The land to the north-west of the building is predominantly grassed, with an asphalt surfaced area to the north, providing access to a disused unit within the overall building. A conifer hedge is present at the south-eastern end. Asphalt surfacing dominates the area to the south-east, with thin strips of soft landscaping and trees along the south-eastern boundary.

A topographical survey of the site by Shaw Colegate (Job no.13118_TP_REV_A, dated December 2018) indicates that the site has an elevation of approximately +17.00mOD at the north-east and +16.00mOD at the south-western area of the site, with the raised grassed area in the south-east attaining an elevation of about +17.30mOD.

The site features (at the time of reporting) are shown on the Site Plan, the aerial photograph on the front cover, and on the topographical survey drawing, which are all included in Appendix A.

3.0 EXISTING ENVIRONMENTAL INFORMATION

Several previous environmental reports are available for this site, which must be read in conjunction with this report. A summary of these reports is provided below.

3.1 Groundsure Screening Report

A Groundsure Screening Report, Ref. SF-5665919, dated December 2018 has been made available for our review. The report is provided as Appendix C and the main findings are summarised below:

- Contaminated Land assessment - Past Land Use - Moderate-High
- Waste and Landfill - Low
- Current and Recent Industrial - Moderate-High
- The following potentially contaminative land uses of significant concern have been identified at the study site: 1963 - a factory since this time.
- The following potentially contaminative land uses of significant concern have been identified in proximity to the study site: 1968 - a gasholder identified 7m to the north of the site since this time. Additionally, past and current land uses of moderate concern have been identified in proximity to the study site. Furthermore, a historical NIHHS site is noted to lie 2m to the north.
- Potentially vulnerable receptors have been identified including current and future site users, ground workers during redevelopment, residents of nearby dwellings with gardens, a stream 20m to the north west of the site and the underlying Secondary A aquifer. In addition, the site lies within a Source Protection Zone 1c. It should be noted that the aforementioned Source Protection Zone (confined aquifer) is unlikely to be affected unless deep drilling or excavations are planned at the site.
- Conclusion: Groundsure has identified a potential contaminant-pathway-receptor relationship that may give rise to significant environmental liability.

3.2 Local Authority Information

Havant Borough Council has provided contamination information for the site in their letter ref. GEN/18/01229 dated 23 January 2019 (see Appendix D). The Environmental Health Officer has advised the following. Many of the features identified are thought to be historical and no longer present on site.

Contamination

A search of planning files has identified the following potential on-site sources:

- Engine Room depicted on plans (new cooperate dairy depot)
- 3-Chamber Brick Built interceptor & Vehicle Storage Garage
- Fuel tank compound in SE of site adjacent to former cycle store, marked on 'existing' plans
- Transformer enclosure in SE of site adjacent to former cycle store, East of oil storage, marked on 'existing' plans
- Boiler Room in SW of 1963 building footprint
- Garage in NW corner of 1963 building footprint
- Above Ground Storage Tank 6'0" x 4'0" x 4'0", raised on Brick Piers. Material stored is unknown (plan has poor legibility, but appears to indicate 'gas oil' for 'heater')
- Eastern Half of North facade of 1963 building footprint

- Inflammable materials store 12'8" x 8'8", brick built, independent outbuilding located NE of the 1963 building extents
- Possible Incinerator unit within 7'0" x 7'0" independent outbuilding located NE of the 1963 building extents, ~25' from Inflammable store. Poor legibility on plan, unconfirmed
- Printing & paper pattern manufacture - principal building use. Storage & handling of inks & solvents expected

Land use adjacent and within the vicinity of the site has the potential to cause contamination (various engineering uses/tooling, plant hire/depot/civil engineering uses, and gas storage). The Southern Gas site adjacent to the North has several references in the plans to acid bath cleaning of gas fittings & components, and the cleaning & servicing of small gas appliances. Several soakaways are also noted on the plans, which may be capable of influencing local groundwater flows (&/or contamination distributions).

In terms of the general environmental context of the site:

- The site is located within an SPZ 1c (sub-surface).
- Records show the site to be underlain by compact medium gravel with flint cobbles and sandy clay. Porous strata (noted 'highly permeable'), with groundwater levels at around 12.6m AOD. This is considered likely to represent the secondary aquifer, and continuity with the local surface water course is assumed until shown otherwise.
- Limestone may be encountered at around 12m below ground (around 2-3m AOD), but this does not represent the chalk aquifer. Chalk anticipated from nearest BH record to be below -29m OD.
- Site boundary is within 25m of a statutory main river (Lavant). Associated flood risk is to the West of the channel.
- Local Public Sewers discharge directly to the Lavant immediately West of the site
- Closest human receptors are >30m from site, beyond river channel. Commercial GAC are acceptable for Human Health screening. Secondary Aquifer, and local Surface Water are principle receptors of concern.
- It is unlikely that piling will be required to such depths as to be likely to materially impact the principal aquifer. The EA may wish to comment due to proximity to the Lavant. The LLFA will wish to comment on SuDS/Reduction of Downstream Flooding risk.

Suds/Pollution Risk

- B2/B8 loading areas are considered to be a moderate risk (of minor collisions, fuel spillage/leakage, and spillage/leakage of goods/products/materials handled in connection with the business). Given the proximity to a local main river, infiltration drainage should only be used where it is shown that there is no existing contamination risk, and care should be taken to ensure that the drainage system does not function as a vector for pollutants to become soil contaminants (capable of migrating to the river & causing harm).
- Similarly, any discharge to the public sewer network (including via existing site services) should be attenuated to minimise downstream flooding risk to the satisfaction of the LLFA, and should seek to attenuate pollutants to an appropriate degree - particularly suspended solids and LNAPL.

3.3 Structural Soils Phase 1 information

In their 'Interpretive Report on Ground Investigation' dated February 2019 (see Appendix E), Structural Soils have summarised an existing Phase 1 Environmental Site Assessment report by The Vertex Group Inc, dated October 2016 (see Appendix B) for an American client, and used American rather than UK phrasing. It identified what it referred to as Recognised Environmental Conditions (RECs) in connection with the site. The report defined RECs as the presence or likely presence of hazardous substances or petroleum products in, on, or at a property, due to the release to the environment, under conditions indicative of a release to the environment or under conditions that pose a material threat of a future release to the environment. A summary of the main findings from the report is presented below:

Site history

The information from the Phase 1 Environmental Site Assessment, indicated that the site was originally agricultural land and was first developed between 1955 and 1960 by Butterick. The factory first occupied approximately a third of the site and was expanded by 1973 to a footprint similar to today's buildings. From first construction to the early 1990s, originally one and then two linear structures appear to have been present along the southern boundary. Butterick originally printed sewing patterns in their factory until 30 years ago and now lease most of the site to other businesses and only occupy about 15% themselves. 15 commercial businesses operate on site and include manufacture of plastics and car turntables, testing of digital production equipment, pet supplies, woodwork workshops and further office-based activities.

The surrounding industrial estate was also developed from agricultural land in the 1960s. A gas holder is present adjacent/north of the site and was first shown on historical mapping in 1960. It is known that the gas holder stopped being used 5 to 6 years ago.

Potential sources of contamination

The Vertex Group Inc have identified RECs in connection with the site to include the historical use of the site as a printing works, industrial processes in the immediate surrounding area and the former gas holder to the north. There are known asbestos containing material (ACM) at the site, which are recorded and managed using an asbestos register. Given the age of the building, there is the potential for lead-based paint to have been used within the building. Radon levels in the local area are low and protection measures are not required.

Recommended ground investigation

The Phase 1 report by the Vertex Group Inc recommended that no assessment of the ground and groundwater conditions at the site would be required, given that the use of the site remains the same. However, an intrusive ground investigation would be required to give a preliminary indication of any contamination beneath the site. An initial ground investigation has been undertaken by SSL, whilst the site was still occupied. Further investigation should be undertaken if the buildings on site are to be demolished and replaced.

3.4 Structural Soils Phase 2 Report

Structural Soils have carried out a preliminary Phase 2 investigation entitled 'Interpretive Report on Ground Investigation' dated February 2019, the environmental aspects of which are summarised as follows:

- The purpose of the investigation was to assess the contamination status of the site, which the Client is purchasing. As noted in section 7.1, it is possible that the site will be redeveloped, but would remain commercial. A desk study carried out previously by others had concluded that risks to the site were low, and that no intrusive investigation was required. The Client wished to carry out an investigation to confirm that the risk of contamination was low.
- As well as general site coverage, the area next to the gasholder in the adjacent site was targeted, as the Client had expressed concern that this might be a source of contamination. The site was never a gasworks, and so the common gasworks contaminants such as phenols are not relevant here. The gasholder is of the spiral-guided type. The only possible contaminants are hydrocarbons used to provide a floating seal between the gas and water beneath, to prevent absorption of gas by the water on which the gasometer 'floats'.

SSL have undertaken a series of shallow boreholes in external areas of the site and following their work have summarised their findings as follows:

- There were no olfactory or visual indications of contamination in any of the holes.
- The contaminants assessed against the GAC's are: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, Polycyclic Aromatic Hydrocarbons (PAH) & Total Petroleum Hydrocarbons (TPH). All of the individual results for the remaining contaminants were all below the GACs for a commercial end-use.
- The investigation has shown contaminant levels in the soil to be below the assessment criteria, which indicates that no risks to human health have been identified.
- One shallow and three deeper window sample holes were drilled at the northern end of the site, closest to the gasholder. These reached a maximum depth of 3.45m, in gravelly and clayey gravel soils (Head Deposits). Although some of the soils are gravels, all are clayey and relatively impermeable, and lateral migration of any hydrocarbon contamination that might have leaked from the gasometer is unlikely. No visual evidence or odours of hydrocarbons were noted in any of the window sample holes on the nearby part of the site – nor in those more distant from the gasholder.
- SSL have concluded that "No contamination has been recorded at the site resulting in no complete pollutant linkages being identified. It is therefore considered that the site is fit for the proposed end use without further assessment or remediation".

4.0 SCL EXPLORATORY WORK

The SCL ground investigation was carried out in two stages on 14 and on 23/24 May 2019 under supervision of an experienced geo-environmental engineer and comprised the following elements.

4.1 Rotary auger boreholes

Three boreholes (BH101 to BH103) were constructed using a tracked rotary-auger drilling rig, with the boreholes terminating at a maximum depth of 6.45m below existing ground level (bgl). In situ Standard Penetration Tests (SPTs) were undertaken at regular intervals and representative soil samples were collected for description and for testing. PID headspace testing was also carried out. The calibration certificate for the SPT equipment used indicates that Energy Ratio, Er, of 79%.

4.2 Dynamic sampler boreholes

Eight dynamic (windowless) sampler boreholes (BH104 to BH111) were completed to between 2.45m and 5.45m depth bgl using track-mounted equipment. This method provides a near-continuous profile of the soil and allows for SPTs and pocket penetrometer tests, as appropriate. Representative samples were taken for geotechnical and contamination testing and PID headspace testing was carried out. The calibration certificate for the SPT equipment used indicates that Energy Ratio, Er, of 88%.

4.3 Installations

50mm ID combined gas/water monitoring pipes were installed to between 2.5m and 6.0m depth in the rotary auger boreholes, whilst 35mm ID monitoring pipes were also installed in dynamic sampler boreholes BH105 and BH111 to 5.0m depth.

4.4 Infiltration testing

Two falling head tests were undertaken within BH106 and BH110 to provide preliminary information on the water infiltration rates within the shallow soils.

4.5 CBR testing

Six TRL DCP tests (TRL104, 105, 107, 109, 110 & 111) were undertaken adjacent to the equivalently-numbered boreholes, to provide information on the CBR values applicable to the shallow soils.

4.6 Monitoring

At the time of writing, monitoring of groundwater and ground gas/VOCs was undertaken on two occasions; 03 June and 12 June 2019. Four further monitoring visits are proposed and this report will be updated with the findings once this work is complete.

4.7 Geotechnical laboratory testing

The following geotechnical laboratory testing was completed by SCL:

-  Natural moisture content
-  Index properties tests (Atterberg Limits)
-  Particle size distribution tests

4.8 Contamination and chemical testing

Selected soil and groundwater samples were delivered to a specialist laboratory (DETS Ltd) and the following testing was carried out:

General suite (soil & water)	-	15no samples
TPH CWG & BTEX/MTBE testing (soil & water)	-	9no samples
PCB testing (soil & water)	-	8no samples
VOC/SVOC testing (soil & water)	-	5no samples
Asbestos screening	-	13no samples
Waste Acceptance Criteria (WAC)	-	2no samples
Soluble sulphate/sulphur/pH analyses	-	21no samples

The borehole records, field testing/monitoring and the laboratory testing results are included in Appendix A. A Site Plan is also provided showing the exploratory locations.

5.0 GROUND CONDITIONS

The 1:50,000 scale BGS map of the area indicates that the site is underlain by superficial deposits - Head deposits in the western half (described by the BGS as clay and gravel) and River Terrace Deposits (undifferentiated) in the eastern part of the site (described as sand, silt and clay). The London Clay Formation is then present mainly comprising bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite.

The nearest, relatively deep (10m) BGS database borehole to the site (SU70NW390) is located some 100m to the east and recorded the superficial deposits to a depth of 6.7m (about +11.3mOD), followed by the London Clay, generally described as firm becoming stiff brown silty sandy clay. Further information, from a site located directly south of this site, reported the London Clay at between 5.2m and 6.2m depth, approximately at +10.0m and +11.5mOD, rising in elevation towards the north. The stratum was described as firm becoming stiff and very stiff silty sandy gravelly clay. The previous Structural Soils Phase 2 investigation at the site did not penetrate the superficial deposits with a maximum depth achieved of 3.45m.

Our boreholes have confirmed the presence of made ground, followed by natural superficial deposits and then, in the deeper boreholes, finer soils of the London Clay Formation. A summary of our findings from our boreholes is presented below:

Stratum	Depth to base	Approximate base elevation	Thickness
Made ground	0.1m to 1.1m	+15.3 to +16.35mOD	0.1m to 1.1m
Superficial deposits (predominantly clayey gravel)	3.6m to 5.2m	+10.95 to +12.8mOD	3.0m to >5.15m
London Clay Formation (soft/firm clay & silt with some sand)	Maximum 6.45m reached	Not proven (+9.95mOD reached)	2.85m proven maximum

Note: levels are approximate only

5.1 Made ground

Made ground thicknesses of between 0.1m and 1.1m were recorded in our boreholes. Beneath the concrete slab (0.17-0.55m thick) within the building, or, externally, asphalt surfacing or topsoil, the unit generally comprised a variable, non-engineered mixture of ashy sandy gravel (clinker, flint, concrete and brick, with some bitumen-coated stone), and gravelly silty clay. Structural Soils reported topsoil/made ground thicknesses of up to 0.55m in their boreholes, and the stratum is generally described as sandy silty gravel (concrete, brick and charcoal).

5.2 Superficial deposits

The BGS map indicates that there is a geological boundary across the site between Head deposits and River Terrace Deposits; however, we have found similar, albeit variable lithology across the site and therefore use the undifferentiated term 'Superficial deposits' for these units in this report.

These natural superficial deposits were met below the made ground in all our boreholes, attaining a thickness of between 3.0m and >5.15m, and extending to a depth of between 3.6m to 5.2m below ground level where fully penetrated. A general trend of increasing thickness from north to south is indicated from the boreholes. These soils generally comprised light brown, brown or dark brown clayey/slightly clayey sandy gravel with variable amounts of silt and sand. The gravel comprised fine to coarse flint with possible cobbles also present, as evidenced by the difficulty in drilling through these deposits. Some lenses/pockets of slightly gravelly slightly sandy/silty clay were also present. Live and decomposed roots were also noted locally.

Particle size distribution tests indicate a variable fines content is present (4-22% with one result of 58% in a clay lens/pocket), sand (5-34%) and gravel (59-91% with one result of 8%).

In situ Standard Penetration Test (SPT) 'N' values exhibit a large scatter, a phenomenon considered to primarily be a result of the variable gravel/clay content, and generally ranged between 13 and >50, indicating a medium dense to very dense state of compaction. Several lower values (<10) were locally present (in BH110 and BH101) indicating a loose state (or a less gravel-dominant zone with low/medium strength clay predominating). The Structural Soils SPT results (available to 3m depth) are in close agreement with our results, ranging between 10-38 blows initially (at about 1m depth), to between 18 and >50 blows at 2-3m depth.

5.3 London Clay Formation

This stratum was present beneath the superficial deposits, at between 3.6m and 5.2m depth below ground level (about +10.95m to +12.8mOD), and continued to the base of the boreholes at a maximum depth of 6.45m (+9.95mOD). A general shallow slope of the upper surface of the clay, rising from south-west to north-east is indicated from our boreholes.

The London Clay generally comprised orange/light brown becoming grey/dark grey, locally mottled, silty/very silty sandy clay grading to clayey silt, with silt/sand partings/lenses and local scattered black specks. Locally, occasional fine flint gravel was also present initially, indicative of a naturally-reworked zone at the boundary with the overlying superficial soils.

In situ SPTs ranged from 4 and 18, indicative of low to medium, locally high strength. Soft to firm consistency is generally indicated by the pocket penetrometer tests. Some of the lower results obtained in silts/fine sands are likely to have been affected by a degree of dilatancy.

A Plasticity Index range of 13-34% and Liquid Limit range of 31-55% was measured, classifying the soils as low to high plasticity clay (BS classification) and low to medium volume change potential (NHBC classification).

5.4 Groundwater

Groundwater was recorded within several of the boreholes during drilling; the observations are detailed on the borehole logs. The nature/speed of drilling may have masked some inflows.

In order to provide steady-state information, 50mm & 35mm ID combined gas/water monitoring pipes were installed in five of the boreholes. During subsequent monitoring of the installations, the following observations were made:

BH	Standpipe depth (mbgl)	Monitoring results (depth – m below lower ground FFL)			
		After drilling	03/06/19	12/06/19	Highest level Approx (mOD)
101	5.0	4.38	Dry	Dry	-
102	2.5	Dry	Dry	Dry	-
103	6.0	4.25	4.15	3.91	+12.49
105	5.0	3.84	3.42	3.26	+12.78
111	4.8	4.36	4.37	4.20	+12.20

Based on the highest recorded water levels on 12 June, groundwater appears to be flowing from west/north-west to east/south-east direction rather than towards the stream/river located to the west of the site.

5.5 Environmental observations

No obvious olfactory or visual signs of gross soil or groundwater contamination were present in the soil or water samples, nor evidence of 'free-phase' hydrocarbon contamination was noted during water sampling. PID readings during and following the fieldwork (during monitoring) did not reveal any significantly elevated VOCs, with some slightly elevated readings considered to be associated with the presence of asphalt/bitumen at some locations.

6.0 GEOTECHNICAL ASSESSMENT

It is proposed to demolish the existing building occupying the site, and to construct two commercial buildings (comprising twelve new individual units) together with an access road, hard standing areas and limited landscaping. The details of the proposed scheme are shown on the development plans in Appendix A.

The investigation has revealed that the site is underlain by up to 1.1m thickness of made ground, with superficial deposits (mainly clayey gravels) present below. The London Clay Formation, comprising silty sandy clay or clayey silt, was met at between 3.6m and 5.2m depth, continuing to the base of the boreholes at a maximum depth of 6.45m below ground/floor level. Groundwater was generally present within the basal zone of the superficial deposits/top of London Clay.

Spread foundations, placed within the natural soils, should be suitable for supporting the structural loads. Due consideration will need to be given to potential desiccation effects where trees are present.

6.1 Spread foundations

We consider that the natural granular superficial deposits which are present below the made ground will provide an appropriate founding stratum. We recommend a minimum founding depth of 1.0m below existing ground level, although local deepening will be required to ensure that the granular stratum is exposed and that shallow clay layers, where locally present, are bypassed. As required by EC7, the design engineer must ensure that the correct comparisons are made between Design Actions and Design Resistances after the application of appropriate partial factors and using the final base geometry. For ULS design, appropriate bearing resistances should be determined to calculate the degree of utilisation of the foundation (limit state GEO). SLS checks should be carried out using appropriate methods in accordance with current practice.

For preliminary assessment of the feasibility and sizing of foundations, we envisage that an allowable bearing resistance of 140kN/m² would be achievable (with settlements <25mm) in the granular superficial soils; this would be applicable to moderate sized strip or pad foundations, up to say 2.0m width. The above bearing resistance should ensure that the less competent London Clay which is present at depth is not overstressed, although when the layout is finalised interaction effects between foundations should be checked to ensure that the stress increase on the London Clay is within its capabilities. Some variability in the bearing strata should be expected across the site and the foundation design should ensure that sufficient reinforcement is incorporated to control any differential movement.

Although the founding soils are expected to be predominantly granular there is a risk that they contain cohesive layers which would be susceptible to root action. As a precaution, we therefore recommend that, within the zones of influence of existing vegetation the foundations are designed fully in accordance with NHBC Standards (Chapter 4.2, Building near trees') based upon a **low** volume change potential classification (although still subject to a minimum founding depth of 1.0m). For any trees that are not to be removed, mature tree heights should be assumed when determining the safe depths. The existing trees should be identified by an arboriculturalist. For the proposed layout (see Development Plan in Appendix

A), it is likely that a number of the proposed units could be affected, particularly along the north-eastern boundary where a row of trees was present until recently (with some remaining). We note, however, that the effects of these trees will be reduced as they lie at a higher elevation than the land to the south and additional excavations will be required to reach formation/floor slab level.

The foundation excavations will encounter variable made ground which is both cohesive and granular and provision for temporary lateral support should be made. On the basis of the boreholes, foundation excavations should remain dry but it must be noted that groundwater levels can rise significantly during wet periods and perched water could be present where the soils are interbedded. The excavations will need to be carefully inspected by an experienced professional, with local deepening being carried out if loose soils, clays and desiccated/root-infested clays are encountered. The formation should be protected from the elements to avoid exposure and deterioration, with foundations cast or blinded as soon as practicable following excavation.

6.2 Ground floor slabs

The site has been occupied for many years by an industrial building, with the vast majority of the new build area still covered by the existing ground floor slabs. On this basis, we consider that the made ground and natural soils beneath the slabs should be capable of supporting a similar magnitude of loading. The usual precautions of proof-rolling and replacement of soft (and hard) spots would apply but a ground bearing slab design should be appropriate. Plate bearing tests are recommended once the formation is exposed to confirm suitability. The alternative would be to adopt suspended slabs, supported by the main foundations, to excavate and then improve, re-compact or replace the existing soils. Within zones of tree influence, any cohesive fill and superficial clay soils encountered at formation level should be removed down to the gravel layer to prevent potential problems with desiccated soil.

6.3 Pavement construction

Six TRL DCP tests were carried out adjacent to several of the boreholes to provide an estimate of CBR values for pavement design. The results are appended and indicate a significant variation across the site, from 2% to >40%. Overall, a preliminary CBR value of say 5% is considered appropriate for the underlying soils present at shallow depth. The formation should be proof rolled prior to surfacing, and any soft/loose zones replaced with suitably compacted granular material. It may be prudent to use a flexible paving solution in areas likely to be affected by future ground movement as a result of desiccation and seasonal variations in moisture content through growth of vegetation.

6.4 Soakaways

Two preliminary falling head tests were carried out (in BH106 & BH109 – see Appendix A), indicating a significant variation in soakage potential within the shallow soils, with the results ranging between about 1.1E-05m/s initially in BH106 (decreasing to about 1.4E-07m/s below 1.3m depth) and 1.9E-04m/s in BH109. Due to the variance and general poor infiltration rates encountered, it is not considered that soakaways will be an effective way of discharging surface water. If soakaways are considered in the design, then full scale testing should be undertaken.

6.5 Foundation concrete

Relatively low concentrations of water-soluble sulphates (2:1 water/soil extract) were measured in selected soil and groundwater samples, together with slightly alkaline pH values. The results fall into Site Design Class DS-1 of Table C2 given in BRE Special Digest 1 (2005). We assess the site as having 'mobile' groundwater and this would result in an ACEC Site Class of AC-1.

7.0 OUTLINE CONTAMINATION APPRAISAL

This appraisal is generally based on the DEFRA/EA publication CLR 11 (Model Procedures for the Management of Contaminated Land, 2004), adopting current UK practice which uses the Source-Pathway-Receptor methodology to assess contamination risks. For a site to be designated as contaminated a plausible linkage between any identified sources and receptors must be identified, ie whether significant pollution linkages (SPLs) are present. In considering the potential for contamination to cause a significant effect, the extent and nature of the potential source are assessed and pathways/receptors identified; without an SPL there is theoretically no risk to the receptors from contamination. The assessed risks to the various potential receptors are summarised in the tabulated Conceptual Site Model which forms Section 7.6 of this report.

7.1 Existing environmental information

As detailed in Section 3.6, Structural Soils Limited (SSL) have carried out a preliminary Phase 2 investigation entitled 'Interpretive Report on Ground Investigation' dated February 2019 to assess the contamination status of the site. A desk study carried out previously by others had concluded that risks to the site were low, and that no intrusive investigation was required. As well as general site coverage, the area next to the gasholder in the adjacent site was targeted. SSL state that the site as far as they are aware did not form part of gas generating processes and the gasholder is of a relatively modern spiral-guided type. The only considered possible contaminants could be hydrocarbons used to provide a floating seal between the gas and water beneath, to prevent absorption of gas by the water on which the gasometer 'floats'.

SSL have undertaken a series of shallow boreholes in external areas of the site and confirmed the following:

- There were no olfactory or visual indications of contamination in any of the holes.
- The contaminants assessed against the GAC's are: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, Polycyclic Aromatic Hydrocarbons (PAH) & Total Petroleum Hydrocarbons (TPH). All of the individual results for the remaining contaminants were all below the GACs for a commercial end-use.
- The investigation has shown contaminant levels in the soil to be below the assessment criteria, which indicates that no risks to human health have been identified.
- One shallow and three deeper window sample holes were drilled at the northern end of the site, closest to the gasholder. These reached a maximum depth of 3.45m, in gravelly and clayey gravel soils (Head Deposits). Although some of the soils are gravels, all are clayey and relatively impermeable, and lateral migration of any hydrocarbon contamination that might have leaked from the gasometer is unlikely. No visual evidence or odours of hydrocarbons were noted in any of the window sample holes on the nearby part of the site – nor in those more distant from the gasholder.
- SSL have concluded that "No contamination has been recorded at the site resulting in no complete pollutant linkages being identified. It is therefore considered that the site is fit for the proposed end use without further assessment or remediation".

7.2 SCL investigation

The SCL investigation has been designed to supplement the preliminary site-specific information already obtained from Structural Soils, provided additional site coverage (including beneath the floor slab and adjacent to the gas holder) and facilitated monitoring of gas and groundwater levels. Laboratory testing and monitoring have been carried out to identify whether these have caused contamination of the soil/groundwater and whether protection is required from ground gas.

The testing comprised analysis of 13no. soil samples and 2no. groundwater samples for a range of commonly-occurring contaminants which were considered to reflect the potential historical/current site usages and the potential sources. Specifically, analyses for both organic and inorganic contaminants, including PAH, TPH and asbestos screening were included. TPH CWG & BTEX testing, PCB testing and VOC/SVOC testing were also included on some of the samples.

The results have been assessed where relevant against the DEFRA Soil Guideline Values (SGV) and Category 4 Screening Levels (C4SLs), together with the LQM/CIEH Suitable 4 Use Level (S4UL) for Human Health Risk Assessment in which Generic Assessment Criteria (GACs) have been derived from the current CLEA Model (2nd Edition, 2009). For Extractable/Total Petroleum Hydrocarbons, the results have been compared with the frequently used EA remedial target of 1,000mg/kg. Groundwater testing results were assessed against the Water Supply (Water Quality) Regulations 2016, Environmental Quality Standards (EQS), WHO Guidelines for Drinking Water Quality WHO/SDE/WSH/0.5.08/123. The contamination testing was carried out specifically for the purpose of providing a general guidance evaluation for the proposed development. Reference should be made to the foreword to the appended contamination test results in order to fully understand the context in which this discussion should be viewed.

The redevelopment will comprise the construction of a new light industrial development comprising almost total hard cover by the new building and hardstandings, with limited landscaping on the site verges, similar to the current configuration. We have used, where relevant, the trigger levels for **commercial development**.

Using these criteria, with the single exception noted below, **none of the relevant threshold values were exceeded** in any of the samples, either in the soils (made ground and top of natural) or groundwater samples. Many of the results were below laboratory detection levels.

It is noted that in BH101, elevated EPH was recorded together with slightly elevated PAHs in the shallow (0.05m deep) sub-base sample tested. In the groundwater sample from BH101, slightly elevated PAHs were recorded together with several SVOCs above the lower test detection levels. At this locality the sub-base contained asphalt/ash/bitumen below the asphalt surfacing, which is considered the most plausible source of these slightly elevated results. As already noted, no visual or olfactory evidence of gross contamination was noted in the boreholes with no 'free product' present within the groundwater.

The results of the testing (both by Structural Soils and by SCL) suggest that there is no widespread soil or groundwater contamination within the areas investigated. An upper layer of asphalt/bitumen/ash is locally

present and this is considered the only identified contamination in the investigations. Of course, by its nature, a ground investigation can only provide limited site coverage and contamination could still be present in other areas of the site, which were not detected in our boreholes.

Although no Asbestos-Containing Materials (ACMs) were identified, we note that buildings (especially those constructed before 2000) are a potential source of ACM and it has been reported that asbestos is present within the buildings. These matters should be addressed in the demolition/construction H&S plan prior to any demolition or earthworks.

7.3 Ground gas/vapour monitoring

The previous desk study and Structural Soils report did not consider ground gas contamination risks. From the available information, we concur that there are no significant potential known sources of ground gas at the site nor the surrounding areas (for example landfill sites, ground workings etc) and, with limited made ground present, the risks are considered low.

At the time of writing, gas monitoring had been undertaken on two occasions and no elevated levels of methane, carbon monoxide or hydrogen sulphide were measured. PID readings in the borehole installations were all <1ppm which indicate that volatile hydrocarbon compounds are not present at the respective locations. Further monitoring is proposed following industry practice during summer 2019 and this report will then be updated with the results.

On the basis of the risk assessment and monitoring results to-date, we consider that Characteristic Situation 1 (very low risk - as described in CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings", 2007) would probably apply to the site and no gas or vapour mitigation measures are likely to be required, this of course will be reviewed following completion of the gas monitoring regime.

Radon gas protection measures are also not required based on the desk study information.

7.4 Disposal of excavated soils

A rigorous hazard assessment of the results was not within the scope of our investigation, but our preliminary conclusion from the contamination testing and WAC testing (where fluoride was slightly elevated above 'inert' concentrations in one of two samples tested), is that the made ground will probably classify as 'non-hazardous industrial waste', with an 'inert' classification for natural soils. Early consultations should be made with appropriate waste facilities or regulators to confirm the off-site disposal requirements.

7.5 Refined Conceptual Site Model

Taking into account the above discussion, the assessed risks to potential receptors are summarised in the refined Conceptual Site Model below. This identifies the assessed risks for the various sources and receptors identified by the PRA. It then recommends appropriate mitigation measures which should render any SPLs inactive and reduce the risks to acceptable levels:

Source	Pathway	Receptor	Assessed risk, justification and measures to mitigate the risk to acceptable levels
On site: contaminated soil/water	Ingestion & direct contact	End user	Low: - With the exception of the sub-base and groundwater in BH101 which contained some elevated contaminants (EPH and PAH in soil and PAH in water, considered to be due to the presence of asphalt/ash/bitumen within the sub-base), the soils and groundwater elsewhere across the site were free from visual/olfactory evidence of contamination. This was corroborated by analysis. No ACMs were detected - The vast majority of the site will continue to be covered by buildings and hardstanding with only limited landscaping present along the site boundaries, thus the SPL to potentially contaminated soils will be largely broken. Only clean topsoil/subsoil should be used in landscaped areas - A careful watching brief should be kept during construction and if obvious or suspected contamination is encountered this should be dealt with prescriptively
	Ingestion, contact & inhalation	Construction workers and third parties	Moderate: - No ACMs were detected in our samples, but the presence of ACMs within the made ground cannot be fully ruled out. - ACMs are reported within the building and provided these are removed prior to any demolition then there should not be a significant risk to the various receptors - Contaminants hotspot identified in the sub-base in BH101 and is likely to be present elsewhere. This SPL will be active during construction within made ground and the building fabric - The risks to these receptors will be managed through health & safety procedures (including dust suppression during demolition) and CDM regulations
	Leaching from contaminated soils and migration in groundwater	Aquifer and surface water	Low: - The main chalk aquifer is protected by a thick layer of low permeability clayey superficial deposits and the London Clay Formation which will limit the potential for migration - The vast majority of the site will continue to be covered by the new buildings and hardstanding areas, preventing infiltration into the groundwater or contamination of surface runoff water - Analysis of soil and groundwater indicate no widespread contamination is present, which suggest that leaching/cross contamination is currently absent/minimal. The elevated PAHs identified in BH101 groundwater is highly likely to be a result of localised contamination from the shallow ash/bitumen etc. present in the sub-base

Source	Pathway	Receptor	Assessed risk, justification and measures to mitigate the risk to acceptable levels
	Direct contact with soil/water	Building fabric and infrastructure (including water supply pipes)	Low: - Water supply pipe classification will need to be agreed with the local water company - The effects of soluble sulphates and alkali/acidic ground are discussed in Section 6.5 of this report
Off site: contaminated soil/water	Lateral migration of contaminants in groundwater	End-user and buildings	Low: - No contamination measured in soils with the exception of a single shallow sub-base sample in one borehole and groundwater in the same location; both are considered to be due to localised ash/asphalt/bitumen content and no off-site source is likely to be active - Groundwater levels measured are below the depth of any of the proposed building elements
On-site and off-site: Ground gas & vapour	Lateral migration through strata, service runs and cracks in buildings	End-user and buildings	Low: - Made ground is of limited thickness and no significantly organic soil or putrescible/degradable materials were present - Monitoring to-date has not measured any elevated ground gas or significantly elevated VOCs - The monitoring results to-date suggests that CIRIA 665 CS1 may apply and no gas protection measures are likely to be required - Radon protective measures are not required based on the desk study information from Groundsure

In conclusion, based upon the information reviewed and the results of the investigation, our assessment is that with appropriate mitigation measures, it should be possible to reduce all risks to acceptable levels. The required mitigation measures identified above include the use of clean topsoil/subsoil in landscaped areas. Any potential ACMs and other locally elevated contaminants within the made ground (as identified in BH101) must be managed through health & safety procedures and CDM regulations during construction.

The investigations undertaken by Structural Soils and SCL have provided a fairly comprehensive coverage of the site and targeted the main potential off-site sources; however, it is self-evident that there may still be zones of contamination within the site which were not encountered. A careful watching brief should be kept during construction to ensure that any potentially contaminated soil encountered is disposed of in a safe and controlled manner. Site workers should observe normal hygiene precautions when handling soils and if material suspected of being contaminated is identified during construction, this should be set aside under protective cover and further tests undertaken to verify the nature and levels of contamination present.



GENERAL INFORMATION, LIMITATIONS AND EXCEPTIONS

Unless otherwise stated, our Report should be construed as being a Ground Investigation Report (GIR) as defined in BS EN1997-2. Our Report is not intended to be and should not be viewed or treated as a Geotechnical Design Report (GDR) as defined in EN1997-2. Any 'design' recommendations which are provided are for guidance only and are intended to allow the designer to assess the results and implications of our investigation/testing and to permit preliminary design of relevant elements of the proposed scheme.

The methods of investigation used have been chosen taking into account the constraints of the site including but not limited to access and space limitations. Where it has not been possible to reasonably use an EC7 compliant investigation technique we have adopted a practical technique to obtain indicative soil parameters and any interpretation is based upon our engineering experience and relevant published information.

The Report is issued on the condition that Soil Consultants Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the exploratory points which differ from those identified during our investigation. In addition Soil Consultants Ltd will not be liable for any loss arising directly or indirectly from any opinion given on the possible configuration of strata both between the exploratory points and/or below the maximum depth of the investigation; such opinions, where given, are for guidance only and no liability can be accepted as to their accuracy. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

Comments made relating to ground-water or ground-gas are based upon observations made during our investigation unless otherwise stated. Ground-water and ground-gas conditions may vary with time from those reported due to factors such as seasonal effects, atmospheric effects and and/or tidal conditions. We recommend that if monitoring installations have been included as part of our investigation, continued monitoring should be carried out to maximise the information gained.

Specific geotechnical features/hazards such as (but not limited to) areas of root-related desiccation and dissolution features in chalk/soluble rock can exist in discrete localised areas - there can be no certainty that any or all of such features/hazards have been located, sampled or identified. Where a risk is identified the designer should provide appropriate contingencies to mitigate the risk through additional exploratory work and/or an engineered solution.

Where a specific risk of ground dissolution features has been identified in our Report (anything above a 'low' risk rating), reference should be made to the local building control to establish whether there are any specific local requirements for foundation design and appropriate allowances should be incorporated into the design. If such a risk assessment was not within the scope of our investigation and where it is deemed that the ground sequence may give rise to such a risk (for example near-surface chalk strata) it is recommended that an appropriate assessment should be undertaken prior to design of foundations.

Where spread foundations are used, we recommend that all excavations are inspected and approved by suitably experienced personnel; appropriate inspection records should be kept. This should also apply to any structures which are in direct contact with the soil where the soil could have a detrimental effect on performance or integrity of the structure.

Ground contamination often exists in small discrete areas - there can be no certainty that any or all such areas have been located, sampled or identified.

The findings and opinions conveyed in this Report may be based on information from a variety of sources such as previous desk studies, investigations or chemical analyses. Soil Consultants Limited cannot and does not provide any guarantee as to the authenticity, accuracy or reliability of such information from third parties; such information has not been independently verified unless stated in our Report.

Our Report is written in the context of an agreed scope of work between Soil Consultants Ltd and the Client and should not be used in any different context. In light of additional information becoming available, improved practices and changes in legislation, amendment or re-interpretation of the assessment or the Report in part or in whole may be necessary after its original publication.

Unless otherwise stated our investigation does not include an arboricultural survey, asbestos survey, ecological survey or flood risk assessment and these should be deemed to be outside the scope of our investigation.

APPENDIX A

Fieldwork, in-situ testing and monitoring

- ✚ Rotary auger borehole records
- ✚ Dynamic sampler borehole records
- ✚ Standard Penetration Test results
- ✚ Standard Penetration Test hammer certificates
- ✚ Infiltration (falling head) tests
- ✚ TRL DCP test results
- ✚ Results of ground gas/groundwater monitoring

Laboratory testing

- ✚ Summary of classification test results
- ✚ Plasticity Charts
- ✚ Particle size distribution results

Ground profiles

- ✚ SPT N-values vs depth
- ✚ Schematic geological cross sections

Contamination/chemical testing (DETS Ltd)

- ✚ Sulphate/sulphur/pH
- ✚ Soil and water contamination testing
- ✚ WAC test results

Site plans and drawings

- ✚ Topographical survey
- ✚ Proposed site plan
- ✚ Site plan
- ✚ Location maps

38 New Lane							Borehole No: BH101	
Havant, Hampshire PO9 2ND								
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472666E, 107458N		Sheet 1 of 1	
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.45mOD		Report No: 10383/OT	
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 14/05/19	E	0.05	1.6	0.10	16.35		MADE GROUND: asphalt (50mm) over grey/black ashy sandy gravel. Gravel is angular to subrounded fine to coarse flint; some coated with bitumen. Occasional roots	
BH diameter 125mm	PID	0.05						
	E	0.15						
	PID	0.15						

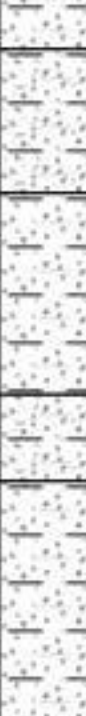
Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH102	
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472583E, 107485N		Sheet 1 of 1	
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.04mOD		Report No: 10383/OT	
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 14/05/19 BH diameter 125mm <								

Site & Location: 38 New Lane Havant, Hampshire PO9 2ND						Borehole No: BH103			
Client: Kingsbridge Estates Limited Pension Scheme				Coordinates: 472661E, 107547N		Sheet 1 of 1			
Engineer: Powell Tolner & Associates Ltd				Ground Level: +16.40mOD		Report No: 10383/OT			
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation	
	Type	Depth (m)		Depth (m)	Level (m)				
BH commenced: 14/05/19 BH diameter 125mm	E PID	0.10 0.10	0.4	0.10	16.30		MADE GROUND: asphalt (50mm) over grey sand and gravel sub-base		
	E PID	0.50 0.50	0.0				Medium dense becoming dense brown very sandy clayey and silty GRAVEL. Gravel is subangular to rounded fine to coarse flint		
	D SPT/C PID	1.00 1.00 1.00	N=21 2.4						
	D SPT/C PID	2.00 2.00 2.00	N=37 0.2						
	D SPT/C PID	3.00 3.00 3.00	N=43 0.6						
				3.60	12.80				
	D SPT/S PID W PID	4.00 4.00 4.00 4.24 4.24	N=4 0.4 0.0						Soft grey mottled brown silty CLAY with frequent bands/ lenses of brown silt and fine sand. Rare fine flint gravel and fine decomposed root hairs
	D SPT/S PID	5.00 5.00 5.00	N=7 0.9						
	D SPT/S PID	6.00 6.00 6.00	N=11 0.5	6.10	10.30				below 6.1m becoming brown/orange very silty CLAY/clayey SILT
				6.45	9.95				Stiff grey CLAY with scattered black specks
End of borehole: 14/05/19 BH depth: 6.45m Water depth: 4.25m							End of hole at 6.45m		
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet								Borehole type: Rotary auger	
Remarks: 50mm ID standpipe installed to 6.0m; response zone 1.0-6.0m Coordinates and levels obtained from GPS unit								Borehole No: BH103	



Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH104		
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472634E, 107477N		Sheet 1 of 1		
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.32mOD		Report No: 10383/OT		
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation	
	Type	Depth (m)		Depth (m)	Level (m)				
BH commenced: 23/05/19 BH diameter 100mm GL to 1m reducing with depth				0.15	16.17		MADE GROUND: asphalt (70mm) over black bitumen-coated gravel		
	D	0.30	0.2				Firm brown silty slightly gravelly to gravelly CLAY. Gravel is fine to coarse, angular to subrounded flint		
	PID	0.30							
	E	0.40							
	PP	0.40		0.60	15.72		Medium dense becoming dense brown clayey sandy GRAVEL with occasional silty/sandy zones (containing little or no clay below about 1.2m). Gravel is fine to coarse, angular to subrounded flint		
	PID	0.40							
	PP	0.50							
	D	1.00							
	SPT/C	1.00	N=13						
	SPT/C	2.00	N=34						
	D	2.30	0.2						
	PID	2.30							
	SPT/C	3.00	N=37						
	SPT/C	4.00	N=7						
End of borehole: 23/05/19 BH depth: 5.45m Water depth: dry	PID	4.30	0.0	4.30	12.02		Soft becoming firm orange/light brown very silty CLAY with rare fine to medium subangular flint gravel. Locally indistinctly laminated.		
	PP	4.40							
	D	4.50							
	PP	4.60							
	PP	4.80	1.1						
							below 4.8m becoming grey		
	SPT/C	5.00	N=11				below 5.2m becoming dark grey		
	PP	5.00	1.0						
				5.45	10.87		End of hole at 5.45m		
								6	
								7	
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet								Borehole type: Dynamic Sampler	
Remarks: Coordinates and levels obtained from GPS unit								Borehole No: BH104	

Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH105	
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472587E, 107521N		Sheet 1 of 1	
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.04mOD		Report No: 10383/OT	
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 23/05/19 Nominal BH diameter 100mm GL to 1m reducing with depth	E	0.20	0.0	0.20	15.84		Grass over topsoil	
	PID	0.20					Firm/stiff brown gravelly to very gravelly very silty CLAY/very clayey SILT. Gravel is fine to coarse, subangular to subrounded. Occasional orange veins	
	PP	0.40						
	PID	0.40						
	E	0.50						
				0.70	15.34		Dense/very dense brown slightly clayey to clayey silty sandy GRAVEL. Gravel is fine to coarse, angular to subrounded flint	
	D	1.00	N=42					
	SPT/C	1.00						
	PID	1.00						
	SPT/C	2.00	N=57					
	D	2.50	0.3					
	PID	2.50						
	SPT/C	3.00	N=34					
				3.20	12.84		Dense brown sandy/very sandy clayey GRAVEL. Gravel is fine to coarse, angular to subrounded flint	
	D	3.50	0.1					
PID	3.50							
SPT/C	4.00	N=48						
35mm ID standpipe to 4.95m	SPT/C	5.00	N=4					
	D	5.20	0.2	5.10	10.94			
	PID	5.20						
End of borehole: 23/05/19 BH depth: 5.45m Water depth: 3.84m				5.45	10.59		End of hole at 5.45m	
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet								
Remarks: Coordinates and levels obtained from GPS unit								
Borehole type: Dynamic Sampler Borehole No: BH105								
								

Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH106			
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472614E, 107537N		Sheet 1 of 1			
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.40mOD		Report No: 10383/OT			
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation		
	Type	Depth (m)		Depth (m)	Level (m)					
BH commenced: 24/05/19 Nominal BH diameter 100mm GL to 1m reducing with depth End of borehole: 24/05/19 BH depth: 3.45m Water depth: dry	E PID	0.40	0.0	0.22	16.18		MADE GROUND: screed (15mm) over concrete			
		0.40		0.35	16.05		MADE GROUND: brick rubble and ash/clinker			
							MADE GROUND: firm brown gravelly silty clay. Gravel is fine to coarse flint and brick			
	E PID SPT/C	0.90	0.0 N=39	0.85	15.55		Brown very clayey GRAVEL. Gravel is fine to coarse, subangular to rounded flints. Occasional cobbles			
		0.90		1.10	15.30		Dense light brown clayey very sandy GRAVEL. Gravel is fine to coarse, subangular to subrounded flint			
		1.00		1.60	14.80		Dense/very dense brown clayey GRAVEL. Gravel is fine to coarse, subangular to rounded flints. Occasional cobbles			
	SPT/C	2.00	N=59				Very dense light brown clayey very sandy GRAVEL. Gravel is fine to coarse, subangular to subrounded flint			
							2.30		14.10	Very dense brown very clayey sandy GRAVEL. Gravel is fine to coarse, subangular to rounded flints. Occasional cobbles
							2.60		13.80	
	SPT/C	3.00	N=52							
			3.45	12.95	End of hole at 3.45m					
								4 -		
								5 -		
								6 -		
								7 -		

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²]
HV = Hand Vane [kPa] PFD = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

Remarks: Coordinates and levels obtained from site survey drawing by Shaw Colegate, Dec. 2018 and are approximate only

Borehole type: Dynamic Sampling

Borehole No: **BH106**



Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH107	
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472628E, 107561N		Sheet 1 of 1	
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.40mOD		Report No: 10383/OT	
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 24/05/19 Nominal BH diameter 100mm GL to 1m reducing with depth	E PID	0.20	0.0	0.17	16.23		MADE GROUND: concrete with plastic membrane at base	
		0.20					MADE GROUND: brown clayey very sandy gravel. Gravel is fine to coarse, angular to subrounded flint and brick	
	E PID	0.80	0.0	0.80	15.60		MADE GROUND: stiff brown silty gravelly CLAY with orange staining and rare live roots (to 1mm diameter). Occasional black spots and rare brick traces	1
		0.80						
	SPT/C	1.00	N=36	1.10	15.30		Dense brown clayey sandy GRAVEL. Gravel is fine to coarse, subangular to rounded flint	2
	SPT/C	2.00	N=22				Firm brown slightly gravelly slightly sandy and slightly silty CLAY with black patches. Gravel is fine to coarse, subrounded flint	3
	PP	2.20	1.7	2.20	14.20		Medium dense brown clayey sandy GRAVEL. Gravel is fine to coarse, subangular to rounded flint	4
		2.30						
	PP	2.30	1.5				Soft greyish green very silty, slightly gravelly CLAY with brown patches and black specks	5
		2.30						
	PID	2.30	0.0	2.50	13.90		Brown clayey sandy GRAVEL. Gravel is fine to coarse, subangular to rounded flint	6
		2.50						
	PP	2.50	1.7				Soft becoming firm/stiff orange brown very silty fine sandy CLAY/clayey SILT	7
SPT/C	3.00	N=15				End of hole at 5.45m		
PP	3.60	1.0	3.60	12.80		End of hole at 5.45m		
PP	3.80	1.0	3.80	12.60		End of hole at 5.45m		
SPT/C	4.00	N=5	4.10	12.30		End of hole at 5.45m		
PP	4.20	0.4				End of hole at 5.45m		
SPT/C	5.00	N=18				End of hole at 5.45m		
End of borehole: 24/05/19 BH depth: 5.45m Water depth: 4.65m			5.45	10.95		End of hole at 5.45m		

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²]
HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

Remarks: Coordinates and levels obtained from site survey drawing by Shaw Colegate, Dec. 2018 and are approximate only

Borehole type:
Dynamic Sampler

Borehole No:
BH107



38 New Lane Site & Location: Havant, Hampshire PO9 2ND							Borehole No: BH108	
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472696E, 107535N		Sheet 1 of 1	
Engineer: Powell Tolner & Associates Ltd					Ground Level: +17.65mOD		Report No: 10383/OT	
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 23/05/19 Nominal BH diameter 100mm GL to 1m reducing with depth							Topsoil	
	E PID	0.30 0.30	0.0	0.30	17.35		Brown clayey slightly gravelly SILT. Gravel is fine to medium, angular to subrounded flint. Orange veining and occasional live roots (to 10mm diameter)	
	E PP	0.80 0.80	2.7	0.75	16.90		Stiff brown gravelly to very gravelly silty CLAY. Gravel is fine to coarse, angular to subrounded flint. Occasional live roots to 2mm diameter	
	PID	0.80	0.0	0.95	16.70		Medium dense to dense brown clayey silty GRAVEL. Gravel is fine to coarse, angular to subrounded flint; some slightly clayey zones	
	SPT/C	1.00	N=30					
	D PID	1.20 1.20	0.0					
	SPT/C	2.00	N=20					
	D PID	2.70 2.70	0.0					
	SPT/C	3.00	N=35					
	SPT/C	4.00	N=41					
35mm ID standpipe to 4.80m	SPT/C	5.00	N=36					
End of borehole: 23/05/19 BH depth: 6.00m Water depth: 5.67m Probing with SPT below 5.45m				5.45	12.20		End of hole at 5.45m	
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.5eV lamp] * = full SPT penetration not achieved - see summary sheet								Borehole type: Dynamic Sampler
Remarks: Coordinates and levels obtained from GPS unit								Borehole No: BH108

[illegible]

Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No: BH110			
Client: Kingsbridge Estates Limited Pension Scheme					Coordinates: 472657E, 107519N		Sheet 1 of 1			
Engineer: Powell Tolner & Associates Ltd					Ground Level: +16.40mOD		Report No: 10383/OT			
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation		
	Type	Depth (m)		Depth (m)	Level (m)					
BH commenced: 23/05/19 Nominal BH diameter 100mm GL to 1m reducing with depth	E PID SPT/C	0.80	0.0 N=9	0.55	15.85		MADE GROUD: screed (40mm) over concrete (310mm) over weak/no fines concrete			
		0.80		0.65	15.75		MADE GROUND: crushed concrete (gravel)			
		1.00					Soft to firm brown gravelly to very gravelly CLAY. Gravel is fine to coarse, subangular to rounded flint			
	D SPT/C PID	2.00	N=6 0.3	1.40	15.00		Loose becoming medium dense brown clayey sandy GRAVEL with zones of slightly clayey GRAVEL. Gravel is fine to coarse, angular to subrounded flint			
		2.00								
		2.00								
	SPT/C	3.00	N=26							
	D SPT/C PID	4.00	N=7 0.3	4.00	12.40		Soft becoming firm brown/orange sandy/very sandy clayey SILT/silty CLAY with rare fine to medium subangular gravel of flint			
		4.00								
		4.00								
PP	4.50	1.2								
PP	4.70	1.0								
PP	4.90	1.1								
SPT/C	5.00	N=12								
PP	5.10	0.8								
End of borehole: 23/05/19 BH depth: 5.45m Water depth: 4.38m				5.45	10.95		End of hole at 5.45m			
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet										
Remarks: Coordinates and levels obtained from site survey drawing by Shaw Colegate, Dec. 2018 and are approximate only								Borehole type: Dynamic Sampling Borehole No: BH110		

Site & Location: 38 New Lane Havant, Hampshire PO9 2ND							Borehole No:	BH111
Client: Kingsbridge Estates Limited Pension Scheme						Coordinates:		472630E, 107505N
Engineer: Powell Tolner & Associates Ltd						Ground Level:		+16.40mOD
						Report No:		10383/OT
Progress & Observations	Samples & Tests		Field Test Results	Strata		Legend	Strata Descriptions	Backfill / Installation
	Type	Depth (m)		Depth (m)	Level (m)			
BH commenced: 24/05/19				0.20	16.20		MADE GROUND: screed (50mm) over concrete. 6mm diameter reinforcement bars at 0.10m	
Nominal BH diameter 100mm GL to 1m reducing with depth	E PID	0.40 0.40	0.0	0.35	16.05		Grey ashy clinker (50mm) and red brick rubble	
	D SPT/C PID	1.00 1.00 1.00	N=29 0.0	1.00	15.40		Dark brown clayey silty GRAVEL. Gravel is fine to coarse, subangular to subrounded	
	SPT/C	2.00	N=30					
	D PID	2.70 2.70	0.0					
	SPT/C	3.00	N=33					
				3.60	12.80		Dense dark brown clayey GRAVEL. Gravel is fine to coarse, subangular to subrounded	
	SPT/C	4.00	N=25					
				4.20	12.20		Medium dense brown very silty, very sandy, slightly clayey GRAVEL. Gravel is fine to coarse, subangular to rounded flint	
	SPT/C	5.00	N=42					
				5.45	10.95		End of hole at 5.45m	
End of borehole: 24/05/19 BH depth: 5.45m Water depth: 4.36m								
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet								Borehole type: Dynamic Sampling
Remarks: Coordinates and levels obtained from site survey drawing by Shaw Colegate, Dec. 2018 and are approximate only								Borehole No: BH111

Site & Location	38 New Lane Havant, Hampshire PO9 2ND	Report No:	10383/OT
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STANDARD PENETRATION TEST SUMMARY

BH ID	Depth (m)	Test type	N value (Note b)	Blow-counts and penetration						Casing depth (m)	Water depth (m)	Remarks
				Seating blows		Test blows						
BH101	1.00	C	N=8	2	2	2	2	2	2		Dry	
BH101	2.00	C	N=17	4	4	4	4	4	5		Dry	
BH101	3.00	C	N=48	12	10	10	12	12	14		Dry	
BH101	4.00	C	N=44	6	9	10	10	12	12		Dry	
BH101	5.00	C	N=7	5	4	2	1	2	2		Dry	
BH101	6.00	S	N=13	3	4	3	3	3	4		Dry	
BH102	1.00	C	N=19	2	3	4	5	4	6		Dry	
BH102	2.00	C	N=44	4	6	10	10	12	12		Dry	
BH102	2.50	C	N=58	10	10	12	14	14	18		Dry	
BH103	1.00	C	N=21	3	4	5	5	5	6		Dry	
BH103	2.00	C	N=37	6	9	10	11	9	7		Dry	
BH103	3.00	C	N=43	6	8	10	12	12	9		Dry	
BH103	4.00	S	N=4	1	1	1	1	1	1		Dry	
BH103	5.00	S	N=7	1	2	1	2	2	2		Dry	
BH103	6.00	S	N=11	2	1	2	2	3	4		Dry	

a) Standard Penetration Test : BS EN ISO 22476:2005 Part 3

b) Where full penetration was not achieved, the total test blow-counts are reported

c) Hammer Energy Ratio, Er = 79%

Site & Location	38 New Lane Havant, Hampshire PO9 2ND	Report No:	10383/OT
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STANDARD PENETRATION TEST SUMMARY

BH ID	Depth (m)	Test type	N value (Note b)	Blow-counts and penetration						Casing depth (m)	Water depth (m)	Remarks
				Seating blows		Test blows						
BH104	1.00	C	N=13	3	3	3	3	2	5		Dry	
BH104	2.00	C	N=34	2	7	7	8	8	11		Dry	
BH104	3.00	C	N=37	8	9	9	10	8	10		Dry	
BH104	4.00	C	N=7	3	4	3	2	1	1		Dry	
BH104	5.00	C	N=11	1	2	2	3	3	3		Dry	
BH105	1.00	C	N=42	4	6	12	10	10	10		Dry	
BH105	2.00	C	N=57	7	10	12	13	17	15		Dry	
BH105	3.00	C	N=34	6	8	7	12	8	7		Dry	
BH105	4.00	C	N=48	9	11	12	10	12	14		Dry	
BH105	5.00	C	N=4	5	1	1	1	1	1		Dry	
BH106	1.00	C	N=39	6	7	8	8	10	13		Dry	
BH106	2.00	C	N=59	6	7	16	12	12	19		Dry	
BH106	3.00	C	N=52	6	9	11	11	14	16		Dry	
BH107	1.00	C	N=36	3	6	6	9	11	10		Dry	
BH107	2.00	C	N=22	4	5	2	3	6	11		Dry	
BH107	3.00	C	N=15	7	8	7	4	2	2		Dry	
BH107	4.00	C	N=5	2	2	1	2	1	1		Dry	
BH107	5.00	C	N=18	2	2	4	5	4	5		Dry	
BH108	1.00	C	N=30	4	5	7	7	8	8		Dry	
BH108	2.00	C	N=20	3	3	4	6	5	5		Dry	
BH108	3.00	C	N=35	3	6	8	10	9	8		Dry	
BH108	4.00	C	N=41	6	10	12	9	10	10		Dry	
BH108	5.00	C	N=36	5	10	10	7	10	9		Dry	
BH109	1.00	C	N=17	1	2	3	5	5	4		Dry	
BH109	2.00	C	N=45	9	10	12	12	10	11		Dry	
BH110	1.00	C	N=9	2	2	3	2	2	2		Dry	
BH110	2.00	C	N=6	1	1	1	1	2	2		Dry	
BH110	3.00	C	N=26	7	5	6	6	7	7		Dry	
BH110	4.00	C	N=7	2	3	1	2	2	2		Dry	
BH110	5.00	C	N=12	2	2	3	3	3	3		Dry	
BH111	1.00	C	N=29	3	6	6	7	8	8		Dry	
BH111	2.00	C	N=30	3	7	7	7	8	8		Dry	
BH111	3.00	C	N=33	7	8	8	8	9	8		Dry	
BH111	4.00	C	N=25	4	8	6	3	6	10		Dry	
BH111	5.00	C	N=42	3	8	12	12	10	8		Dry	

a) Standard Penetration Test : BS EN ISO 22476:2005 Part 3

b) Where full penetration was not achieved, the total test blow-counts are reported

c) Hammer Energy Ratio, Er = 88.2%

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Neil Burrows
Southern Testing Laboratories
Unit 11
Charlwoods Road
East Grinstead
RH19 2HU

SPT Hammer Ref: 110.113
Test Date: 05/10/2018
Report Date: 05/10/2018
File Name: 110.113.spt
Test Operator: N P BURROWS

Instrumented Rod Data

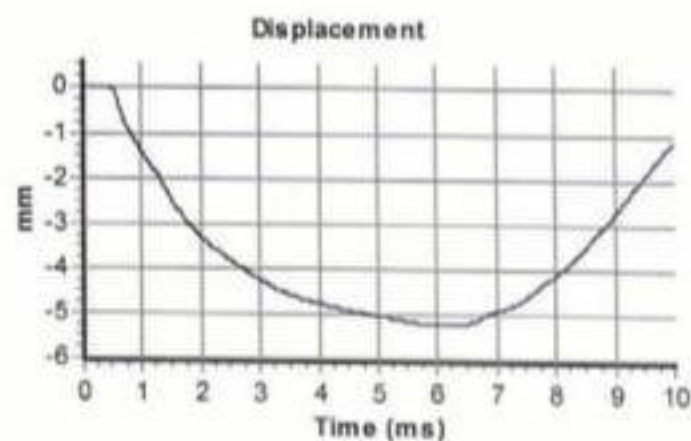
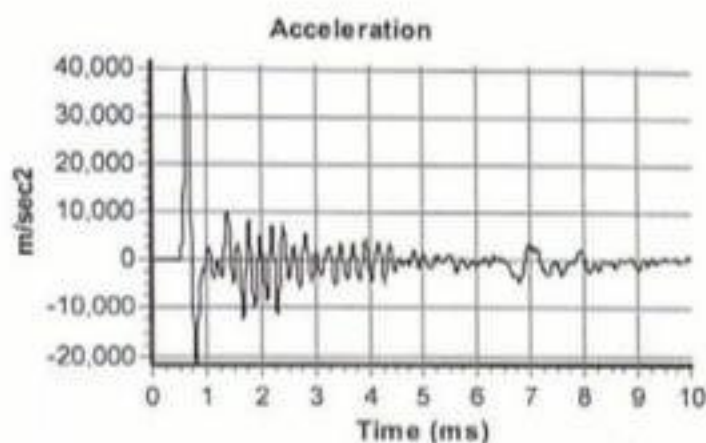
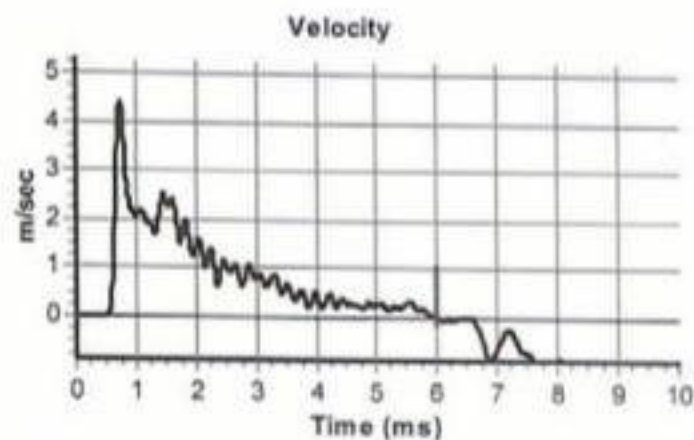
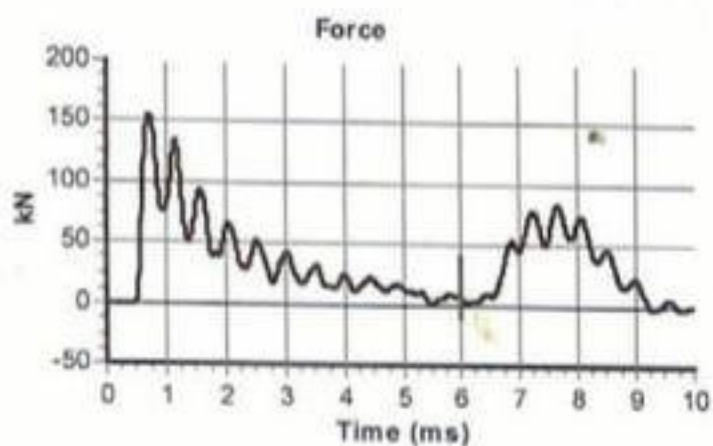
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 6458
Accelerometer No.2: 9607

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 375

Energy Ratio E_r (%): **79**

Signed

Title: Field Operations Manager

The recommended calibration interval is 12 months

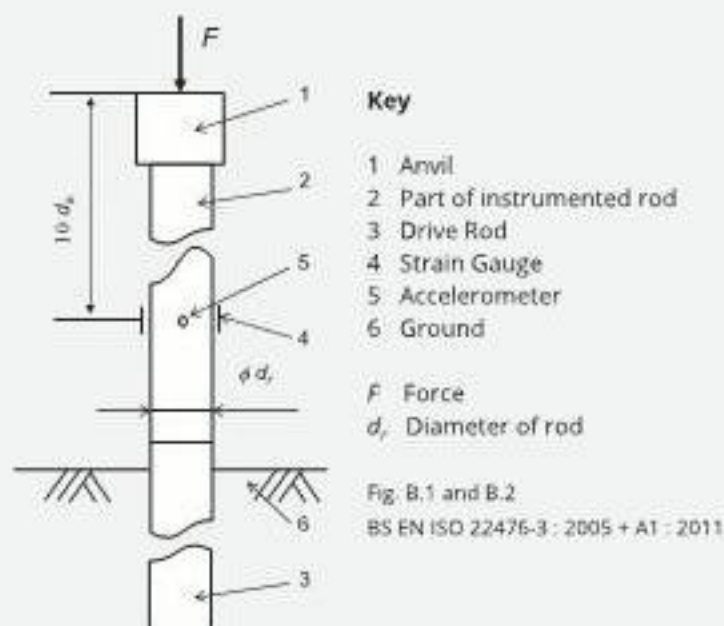
SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer PREMIER
 Test No EQU2319
 Client OAKLAND SITE INVESTIGATION
 Test Depth (m) 10.50
 Mass of hammer $m = 63.5\text{kg}$
 Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
 Length of instrumented rod 0.558 m
 Area $A = 11.61\text{ cm}^2$
 Modulus $E_o = 206843\text{ MPa}$



DATE OF TEST VALID UNTIL HAMMER ID

05/04/2019	04/04/2020	110-106
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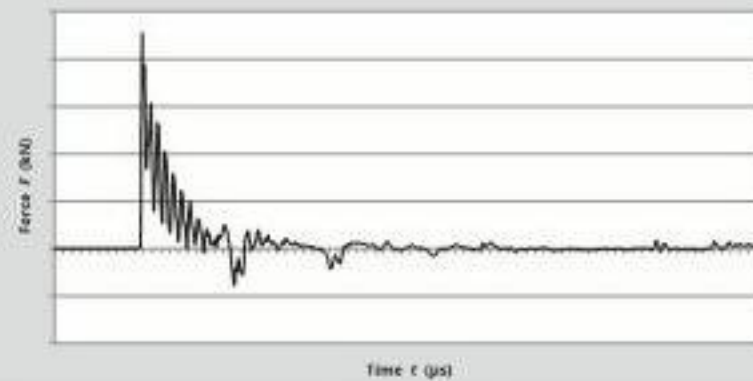
Observations:

1.

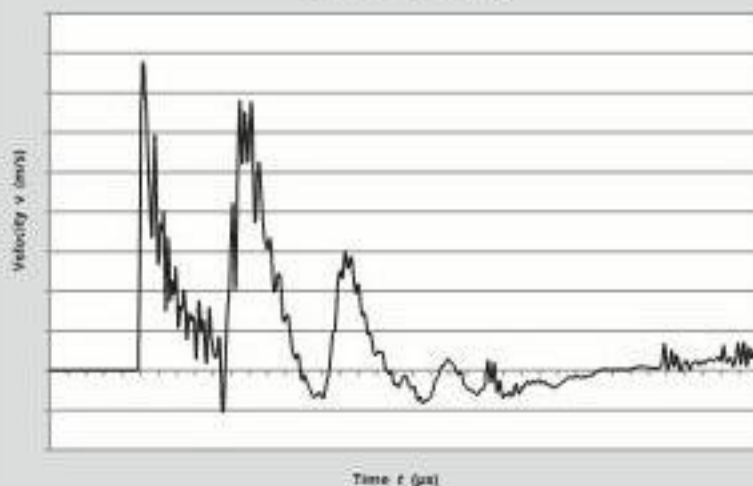
$E_{\text{meas}} = 0.417\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

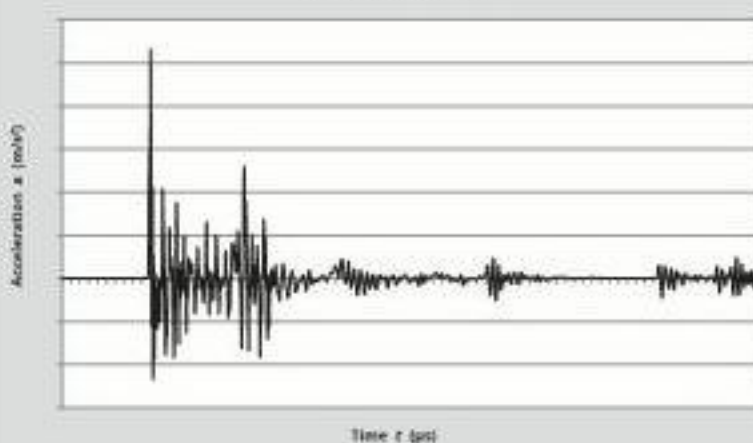
Force



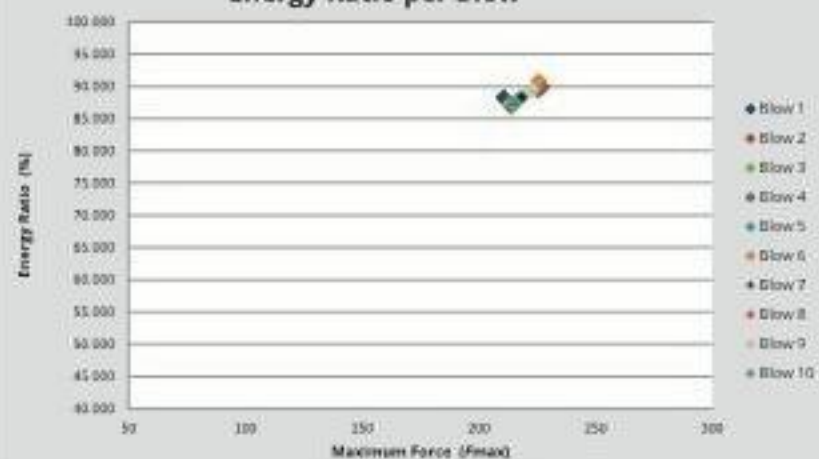
Particle Velocity



Acceleration



Energy Ratio per Blow



$$\text{Energy Ratio (Er)} = \frac{E_{\text{meas}}}{E_{\text{theor}}}$$

88.24%
 © COPYRIGHT 2019

Equipe SPT Analyzer Operator

AF

Certificate prepared by

[Redacted Signature]

Certificate checked by

[Redacted Signature]

Certificate date

17/04/2019

Site Location	38 New Lane Havant, Hampshire PO9 2ND	Report No: 10383/OT
SOAKAGE TEST RESULTS		

Borehole/Trial Pit No: **BH106** Depth: **3.00** Test No: **1**
Date: 24 May 2019

Dimensions:

Width = m
Length = m
Diameter = **0.09** m (90mm)
Casing depth = **0.00** m

Soil description:

See BH106 log

Perimeter = 0.283 m
Base area = 0.006 m²

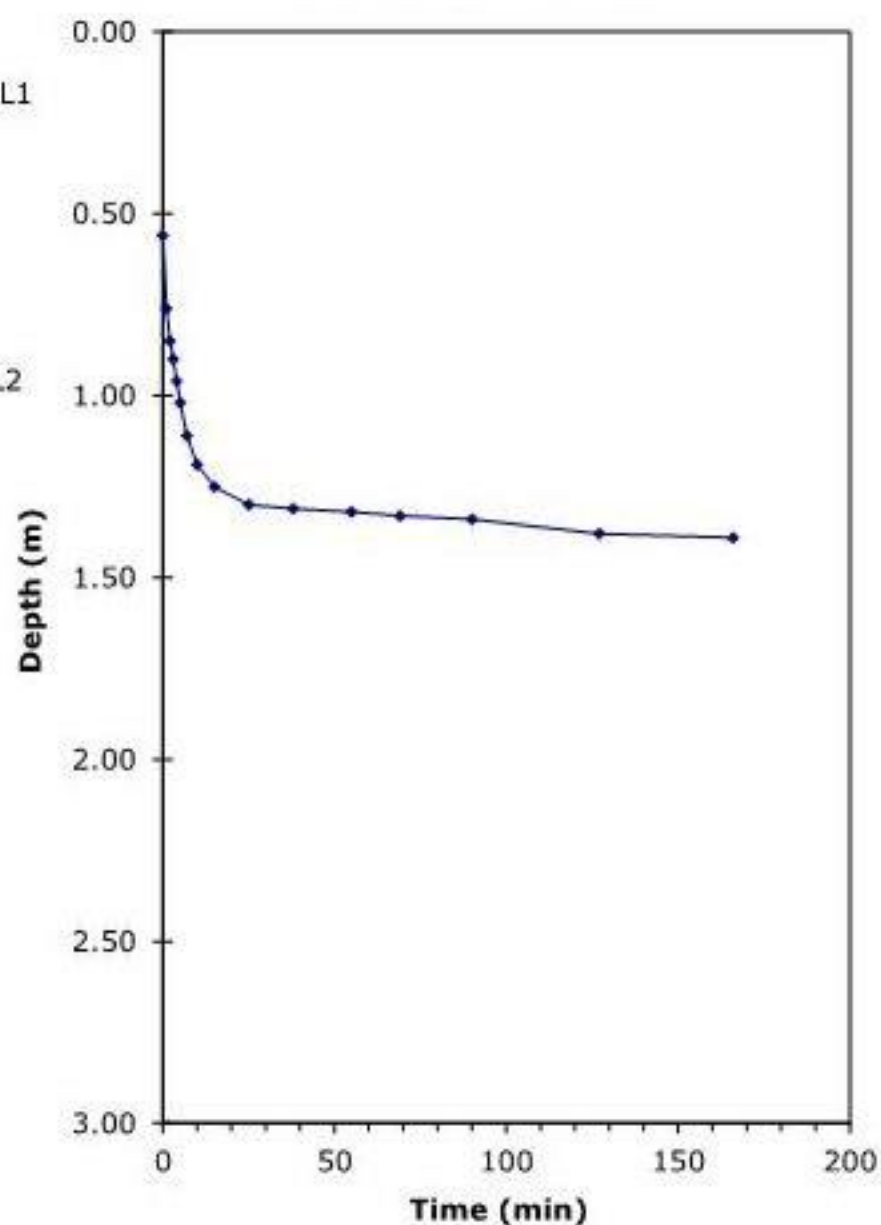
Readings measured from **0.00** m above ground level

Water Level v Time Graph

No	Mins	Depth m	Depth mbgl
1	0	0.56	0.56
2	1	0.76	0.76
3	2	0.85	0.85
4	3	0.9	0.90
5	4	0.96	0.96
6	5	1.02	1.02
7	7	1.11	1.11
8	10	1.19	1.19
9	15	1.25	1.25
10	25	1.3	1.30
11	38	1.31	1.31
12	55	1.32	1.32
13	69	1.33	1.33
14	90	1.34	1.34
15	127	1.38	1.38
16	166	1.39	1.39

<< WL1

<< WL2



	Water Level (m)	Time (sec)
WL 1 [top]	1	0
WL 2 [bottom]	8	600

Vol change = 0.00 m³ V
Soakage area = 0.6073 m² A
Time = 600 sec T

Soakage Rate (shallow) 1.10E-05 m/sec

Soakage Rate is calculated using two selected water levels and is based on BRE Digest DG 365: 2016 Soakaway Design

Site Location	38 New Lane Havant, Hampshire PO9 2ND	Report No: 10383/OT
SOAKAGE TEST RESULTS		

Borehole/Trial Pit No: **BH106** Depth: **3.00** Test No: **1**
Date: 24 May 2019

Dimensions:

Width = m
Length = m
Diameter = **0.09** m (90mm)
Casing depth = **0.00** m

Soil description:

See BH106 log

Perimeter = 0.283 m
Base area = 0.006 m²

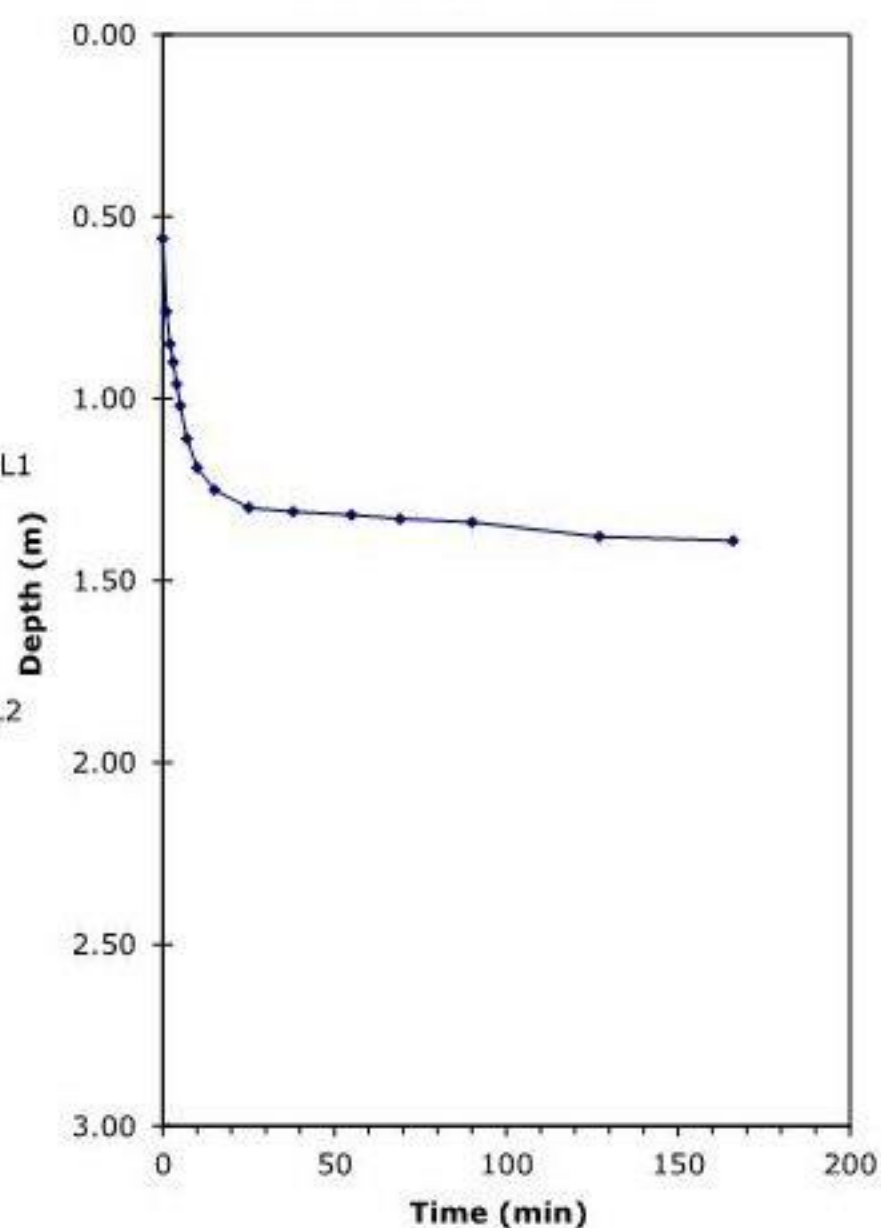
Readings measured from **0.00** m above ground level

No	Mins	Depth m	Depth mbgl
1	0	0.56	0.56
2	1	0.76	0.76
3	2	0.85	0.85
4	3	0.9	0.90
5	4	0.96	0.96
6	5	1.02	1.02
7	7	1.11	1.11
8	10	1.19	1.19
9	15	1.25	1.25
10	25	1.3	1.30
11	38	1.31	1.31
12	55	1.32	1.32
13	69	1.33	1.33
14	90	1.34	1.34
15	127	1.38	1.38
16	166	1.39	1.39

<< WL1

<<WL2

Water Level v Time Graph



	Water Level (m)	Time (sec)
WL 1 [top]	10	1.30 1500
WL 2 [bottom]	16	1.39 9960

Vol change = 0.00 m³ V
Soakage area = 0.4744 m² A
Time = 8460 sec T

Soakage Rate (deep) 1.43E-07 m/sec

Soakage Rate is calculated using two selected water levels and is based on BRE Digest DG 365: 2016 Soakaway Design

Site Location	38 New Lane Havant, Hampshire PO9 2ND	Report No: 10383/OT
SOAKAGE TEST RESULTS		

Borehole/Trial Pit No: **BH109** Depth: **2.00** Test No: **1**
Date: 24 May 2019

Dimensions:

Width = m
Length = m
Diameter = **0.09** m (90mm)
Casing depth = **0.00** m

Soil description:

See BH109 log

Perimeter = 0.283 m
Base area = 0.006 m²

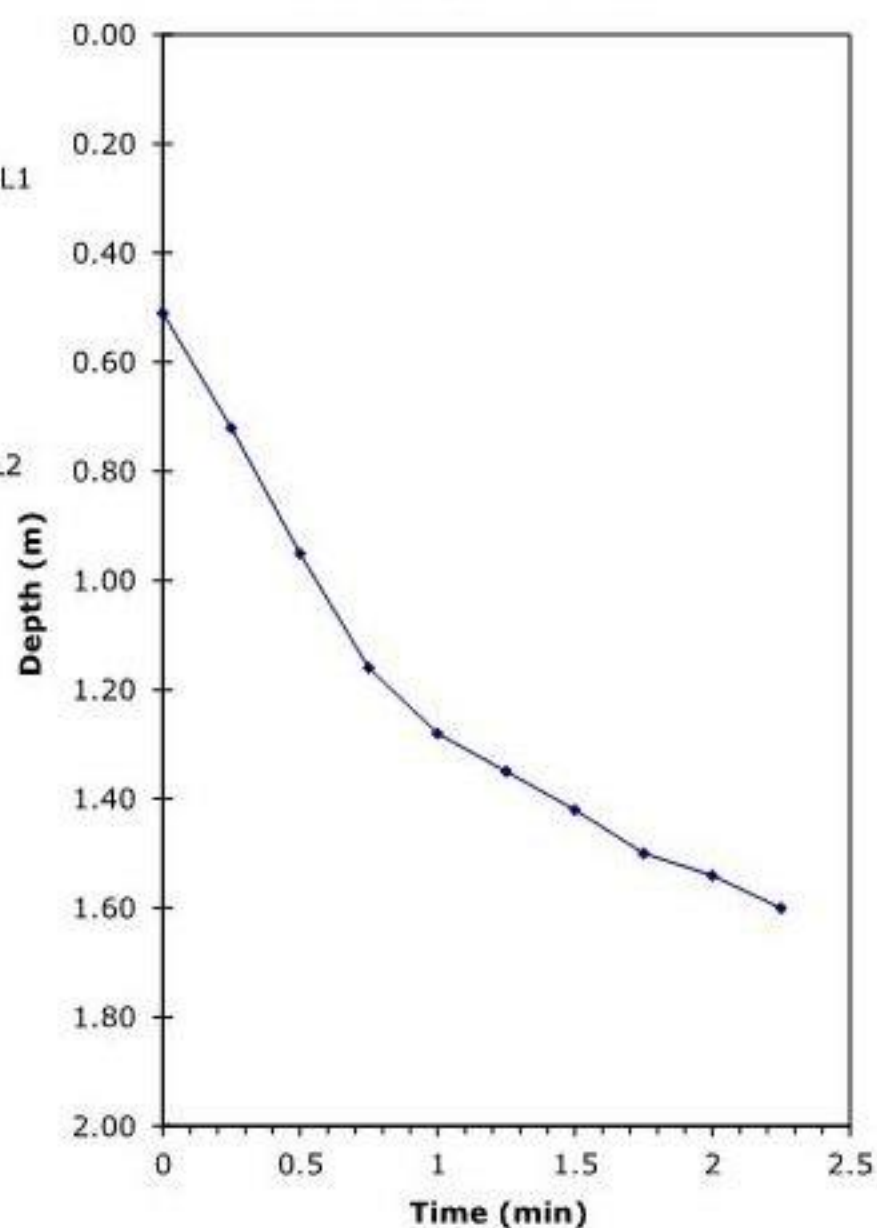
Readings measured from **0.00** m above ground level

No	Mins	Depth m	Depth mbgl
1	0	0.51	0.51
2	0.25	0.72	0.72
3	0.5	0.95	0.95
4	0.75	1.16	1.16
5	1	1.28	1.28
6	1.25	1.35	1.35
7	1.5	1.42	1.42
8	1.75	1.5	1.50
9	2	1.54	1.54
10	2.25	1.6	1.60
Hole collapse			

<< WL1

<< WL2

Water Level v Time Graph



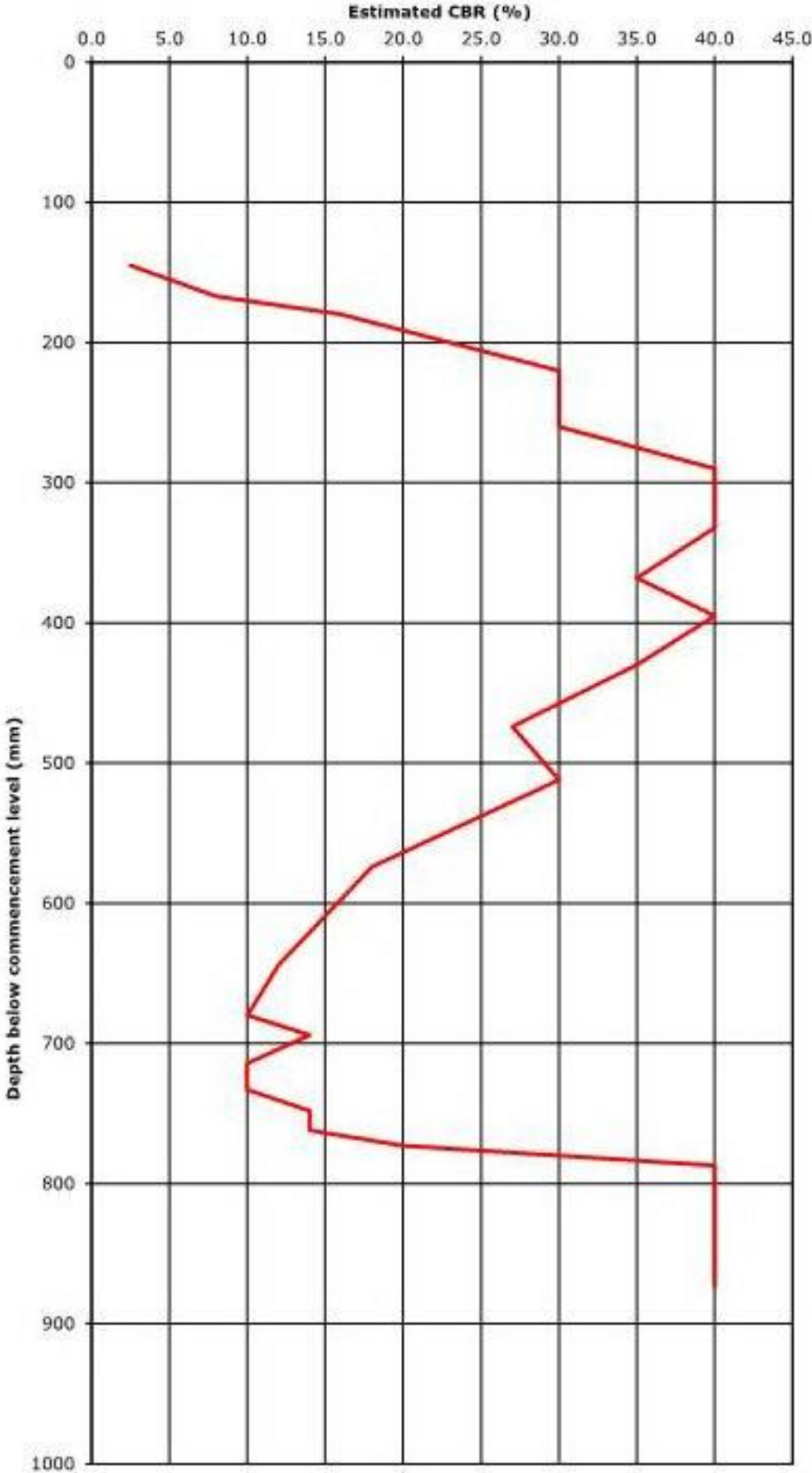
	Water Level (m)	Time (sec)
WL 1 [top]	3	0.95
WL 2 [bottom]	10	1.60

Vol change = 0.00 m³ V
Soakage area = 0.2114 m² A
Time = 105 sec T

Soakage Rate 1.86E-04 m/sec

Soakage Rate is calculated using two selected water levels and is based on BRE Digest DG 365: 2016 Soakaway Design

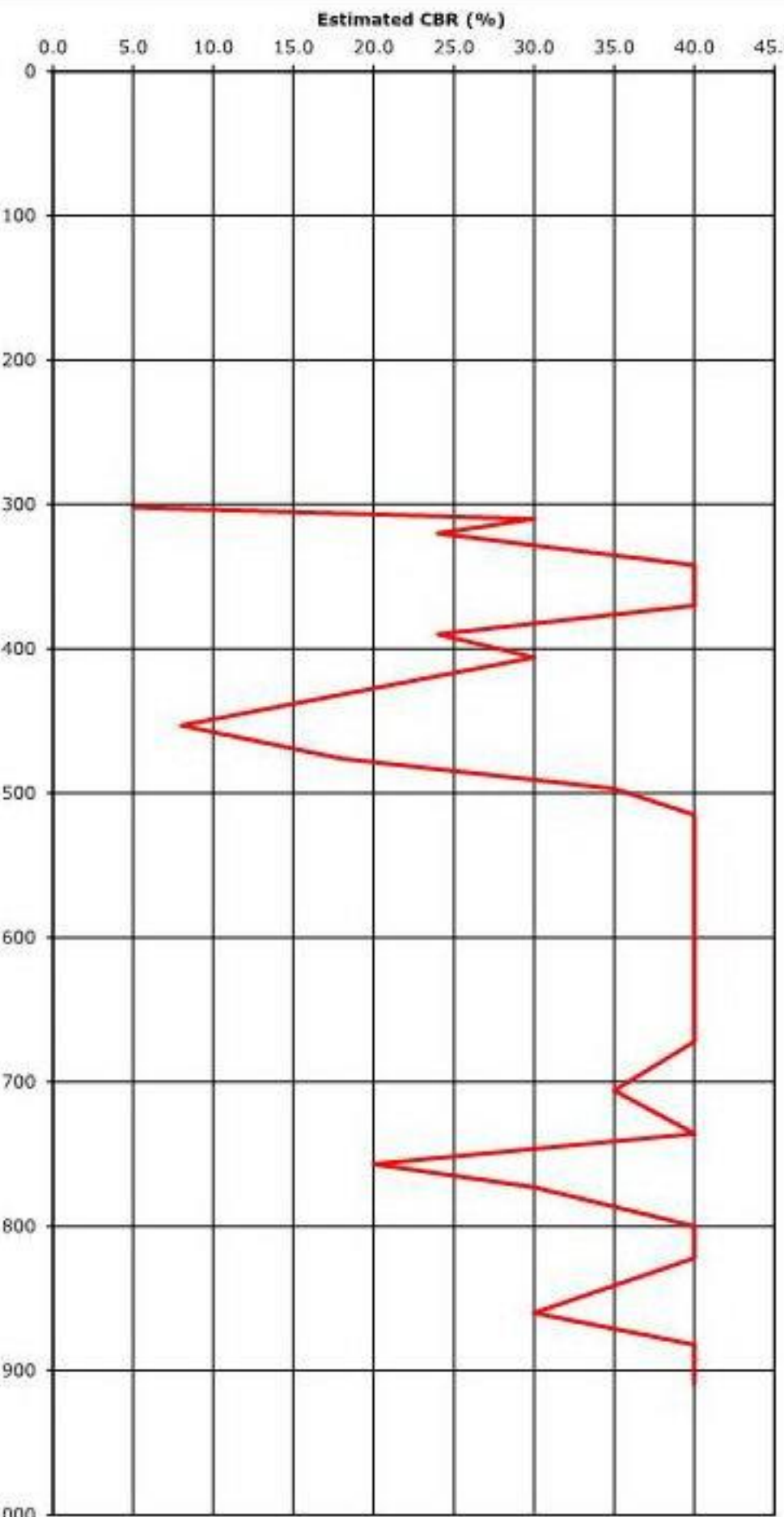
Site & Location				38 New Lane Havant, Hampshire PO9 2ND		TRL Probe No: TRL 104	
Client:				Kingsbridge Estates Limited Pension Scheme		(Sheet 1 of 1)	
Project Managers:				Powell Tolner & Associates Ltd		Report No: 10383/OT	
TRL Dynamic Cone Penetration test result							
Blow Count		Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH		
0		188	0				
1		200	12.0	18.0			
3		223	11.5	18.0			
5		256	16.5	12.0			
7		290	17.0	12.0			
9		360	35.0	5.0			
10		427	67.0	2.0			
11		475	48.0	3.0			
12		515	40.0	4.0			
13		526	11.0	20.0			
15		542	8.0	30.0			
17		556	7.0	35.0			
19		572	8.0	30.0			
21		584	6.0	40.0			
26		605	4.2	40.0			
31		645	8.0	30.0			
36		705	12.0	18.0			
41		760	11.0	20.0			
46		800	8.0	30.0			
51		842	8.4	27.0			
56		876	6.8	35.0			
61		930	10.8	20.0			
					Date of test: 24/05/19		
					Depth test commenced (mbgl): 0.00		
Remarks: a) Test undertaken adjacent to BH104							

Site & Location				38 New Lane Havant, Hampshire PO9 2ND		TRL Probe No: TRL 105	
Client:				Kingsbridge Estates Limited Pension Scheme		(Sheet 1 of 1)	
Project Managers:				Powell Tolner & Associates Ltd		Report No: 10383/OT	
TRL Dynamic Cone Penetration test result							
Blow Count		Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH		
0		92	0				
1		145	53.0	2.5			
2		167	22.0	8.0			
3		180	13.0	16.0			
8		220	8.0	30.0			
13		260	8.0	30.0			
18		290	6.0	40.0			
23		305	3.0	40.0			
28		332	5.4	40.0			
33		368	7.2	35.0			
38		395	5.4	40.0			
43		430	7.0	35.0			
48		474	8.8	27.0			
53		512	7.6	30.0			
58		574	12.4	18.0			
62		644	17.5	12.0			
64		680	18.0	10.0			
65		694	14.0	14.0			
66		714	20.0	10.0			
67		733	19.0	10.0			
68		748	15.0	14.0			
69		762	14.0	14.0			
70		773	11.0	20.0			
75		787	2.8	40.0			
80		801	2.8	40.0			
85		822	4.2	40.0			
90		840	3.6	40.0			
95		860	4.0	40.0			
100		873	2.6	40.0			
					Date of test:		24/05/19
					Depth test commenced (mbgl):		0.00
Remarks: a) Test undertaken adjacent to BH105							

Site & Location				38 New Lane Havant, Hampshire PO9 2ND		TRL Probe No: TRL 107	
Client:				Kingsbridge Estates Limited Pension Scheme		(Sheet 1 of 1)	
Project Managers:				Powell Tolner & Associates Ltd		Report No: 10383/OT	
TRL Dynamic Cone Penetration test result							
Blow Count		Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH		
0		275	0				
1		310	35.0	5.0			
2		325	15.0	14.0			
4		344	9.5	24.0			
6		370	13.0	16.0			
11		404	6.8	35.0			
16		430	5.2	40.0			
21		464	6.8	35.0			
26		506	8.4	27.0			
31		547	8.2	27.0			
36		570	4.6	40.0			
41		610	8.0	30.0			
46		642	6.4	40.0			
51		681	7.8	30.0			
56		719	7.6	30.0			
59		760	13.7	16.0			
63		788	7.0	35.0			
66		817	9.7	24.0			
69		840	7.7	30.0			
72		867	9.0	24.0			
75		887	6.7	40.0			
78		903	5.3	40.0			
81		917	4.7	40.0			
84		940	7.7	30.0			
				Date of test:		24/05/19	
				Depth test commenced (mbgl):		0.00	
Remarks: a) Test undertaken through BH107 corehole							

Site & Location				38 New Lane Havant, Hampshire PO9 2ND		TRL Probe No: TRL 109				
Client:				Kingsbridge Estates Limited Pension Scheme		(Sheet 1 of 1)				
Project Managers:				Powell Tolner & Associates Ltd		Report No: 10383/OT				
TRL Dynamic Cone Penetration test result										
Blow Count		Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH					
0		285	0		Estimated CBR (%) 0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 0 100 200 300 400 500 600 700 800 900 1000 Depth below commencement level (mm)					
1		360	75.0	1.5						
2		390	30.0	5.0						
3		470	80.0	1.5						
4		488	18.0	10.0						
5		515	27.0	6.0						
6		533	18.0	10.0						
7		553	20.0	10.0						
8		570	17.0	12.0						
10		580	5.0	40.0						
12		600	10.0	24.0						
14		620	10.0	24.0						
16		636	8.0	30.0						
18		670	17.0	12.0						
19		690	20.0	10.0						
20		712	22.0	8.0						
21		722	10.0	24.0						
22		742	20.0	10.0						
24		765	11.5	18.0						
26		784	9.5	24.0						
27		805	21.0	8.0						
28		822	17.0	12.0						
29		849	27.0	6.0						
30		873	24.0	8.0						
31		890	17.0	12.0						
32		927	37.0	4.0						
				Date of test:				24/05/19		
				Depth test commenced (mbgl):				0.00		
Remarks: a) Test undertaken through BH107 corehole										

Site & Location	38 New Lane Havant, Hampshire PO9 2ND			TRL Probe No:	TRL 110
Client:	Kingsbridge Estates Limited Pension Scheme			(Sheet 1 of 1)	
Project Managers:	Powell Tolner & Associates Ltd			Report No:	10383/OT
TRL Dynamic Cone Penetration test result					
Blow Count	Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH	
0	720	0			
1	776	56.0	2.5		
2	950	174.0	1.0		
				Date of test: 24/05/19 Depth test commenced (mbgl): 0.00	
Remarks: a) Test undertaken through BH110 corehole					

Site & Location				38 New Lane Havant, Hampshire PO9 2ND		TRL Probe No: TRL 111	
Client:				Kingsbridge Estates Limited Pension Scheme		(Sheet 1 of 1)	
Project Managers:				Powell Tolner & Associates Ltd		Report No: 10383/OT	
TRL Dynamic Cone Penetration test result							
Blow Count	Depth (mm)	mm per blow	CBR (%)	PLOT OF CBR VS DEPTH			
0	270	0					
1	302	32.0	5.0				
2	310	8.0	30.0				
3	320	10.0	24.0				
8	342	4.4	40.0				
13	370	5.6	40.0				
15	390	10.0	24.0				
17	406	8.0	30.0				
19	453	23.5	8.0				
21	476	11.5	18.0				
24	497	7.0	35.0				
29	515	3.6	40.0				
34	533	3.6	40.0				
39	550	3.4	40.0				
44	572	4.4	40.0				
49	586	2.8	40.0				
54	600	2.8	40.0				
64	634	3.4	40.0				
69	656	4.4	40.0				
74	672	3.2	40.0				
79	706	6.8	35.0				
84	736	6.0	40.0				
86	757	10.5	20.0				
88	773	8.0	30.0				
93	800	5.4	40.0				
98	822	4.4	40.0				
103	860	7.6	30.0				
108	882	4.4	40.0				
113	898	3.2	40.0				
118	909	2.2	40.0				
				Date of test:		24/05/19	
				Depth test commenced (mbgl):		0.00	
Remarks: a) Test undertaken through BH111 corehole							

Results of groundwater/gas monitoring

Date:	03 Jun 19	12 Jun 19	
Barometric pressure:			
a) Trend (24hrs):	Steady then rising	Falling	
b) At start (mB):	1014	1010	
c) At end (mB):	1015	1011	
Recorded by:	OT	LT	
Surface ground conditions:	Dry	Wet	
Weather conditions:	Partly cloudy	Heavy rain	
Ambient air temp (oC):	16	14	

Monitoring equipment

Instrument: GA5000, Serial No. G505055

Calibration check details: See note 2 below

Next calibration date: July 2019

Notes:

- 1) Barometric pressure trend and ambient air temperature is recorded from metoffice.gov.uk website on the day of the monitoring visit
- 2) Calibration check is performed at start of monitoring against ambient air and also periodically with a 5% CH₄, 5% CO₂ and 6% O₂ gas mixture
- 3) CH₄ = methane; CO₂ = carbon dioxide; CO = carbon monoxide;
O₂ = oxygen; H₂S = hydrogen sulphide

Results

Date	Time (24hr)	Borehole ID	GW depth	Depth to base	CH ₄ (%)		CO ₂ (%)		O ₂ (%)		Highest (ppm)		Emission rate	Relative pressure	PID
			(m)	(m)	Max	Steady	Max	Steady	Min	Steady	CO	H ₂ S	(l/hr)	(mb)	
03/06/2019	11:25	BH101	Dry	3.97	0.0	0.0	0.2	0.1	20.2	20.5	0.0	0.0	0.0	-	0.0
	11:12	BH102	Dry	2.34	0.0	0.0	1.7	1.7	19.6	19.6	0.0	0.0	0.0	-	0.7
	11:49	BH103	4.15	4.88	0.0	0.0	2.6	2.6	19.0	19.0	0.0	0.0	0.1	-	0.5
	11:58	BH105	3.42	4.85	0.0	0.0	1.9	1.9	19.7	19.7	0.0	0.0	0.0	0.0	0.6
	11:32	BH111	4.37	4.80	0.0	0.0	0.9	0.9	18.7	18.7	0.0	0.0	0.1	-	0.5
12/06/2019	14:40	BH101	Dry	3.98	0.0	0.0	0.6	0.6	20.1	20.2	0.0	0.0	-0.1	-0.2	1.5
	14:28	BH102	Dry	2.34	0.0	0.0	0.7	0.7	20.7	21.0	0.0	0.0	0.0	0.1	0.2
	14:05	BH103	3.91	4.87	0.0	0.0	3.0	3.0	18.6	18.6	0.0	0.0	0.0	0.0	0.2
	13:41	BH105	3.26	4.85	0.0	0.0	2.1	2.1	19.6	19.6	0.0	0.0	0.1	-	0.5
	13:10	BH111	4.20	4.80	0.0	0.0	1.0	1.0	19.0	19.0	0.0	0.0	0.0	-0.1	0.6

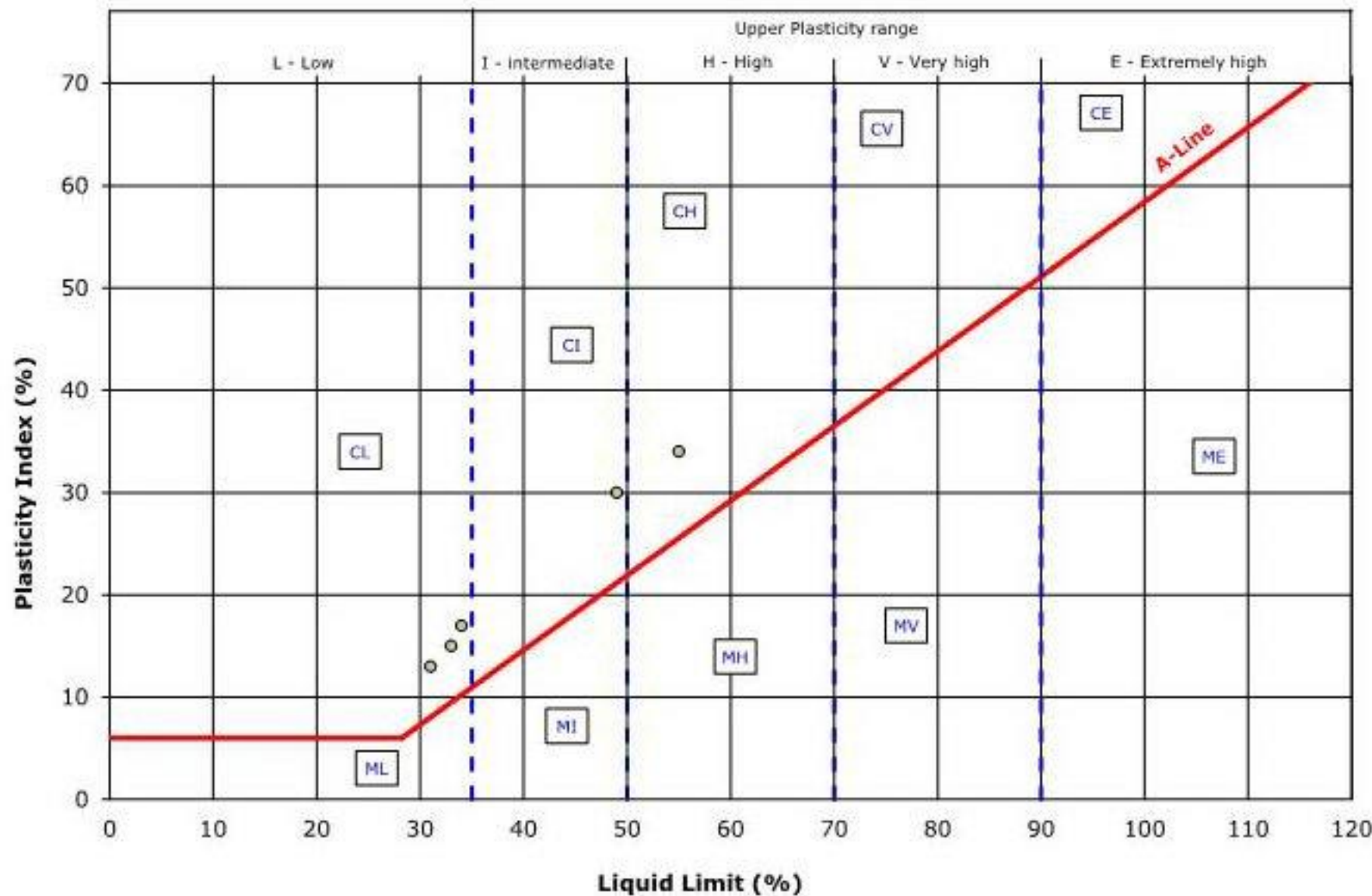
Site & Location	38 New Lane Havant, Hampshire PO9 2ND	Report No:	10383/OT
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SUMMARY OF CLASSIFICATION TEST RESULTS

BH ID	Depth (m)	Type	w (%)	w _L (%)	w _p (%)	Pass 425 (μm) (%)	I _p (%)	Mod I _p (%)	I _L (%)	LOI (%)	Description
BH101	6.00	D	22	34	17	>95	17		0.28		Dark grey/grey sandy silty CLAY with occasional sand partings
BH103	4.00	D	21	49	19	>95	30		0.07		Grey mottled brown silty CLAY with frequent bands/lenses of brown silt and fine sand. Rare fine flint gravel and fine decomposed root hairs
BH103	6.00	D	24	55	21	>95	34		0.10		Grey mottled brown silty CLAY with frequent bands/lenses of brown silt and fine sand. Rare fine flint gravel and fine decomposed root hairs
BH105	5.20	D	24	31	18	>95	13		0.47		Brown very silty CLAY
BH110	4.00	D	21	33	18	>95	15		0.18		Brown/orange sandy/very sandy clayey SILT/silty CLAY with rare fine to medium subangular gravel of flint

Testing in accordance with BS EN ISO 17892 unless specified otherwise	Date:	07 Jun 19
Modified Plasticity Index calculated in accordance with NHBC Standards Chapter 4.2 (reported if %passing 425mm <95%)		
Percent passing 425μm: by estimation, by hand* or by sieving**		(Classification Sheet 1 of 1)

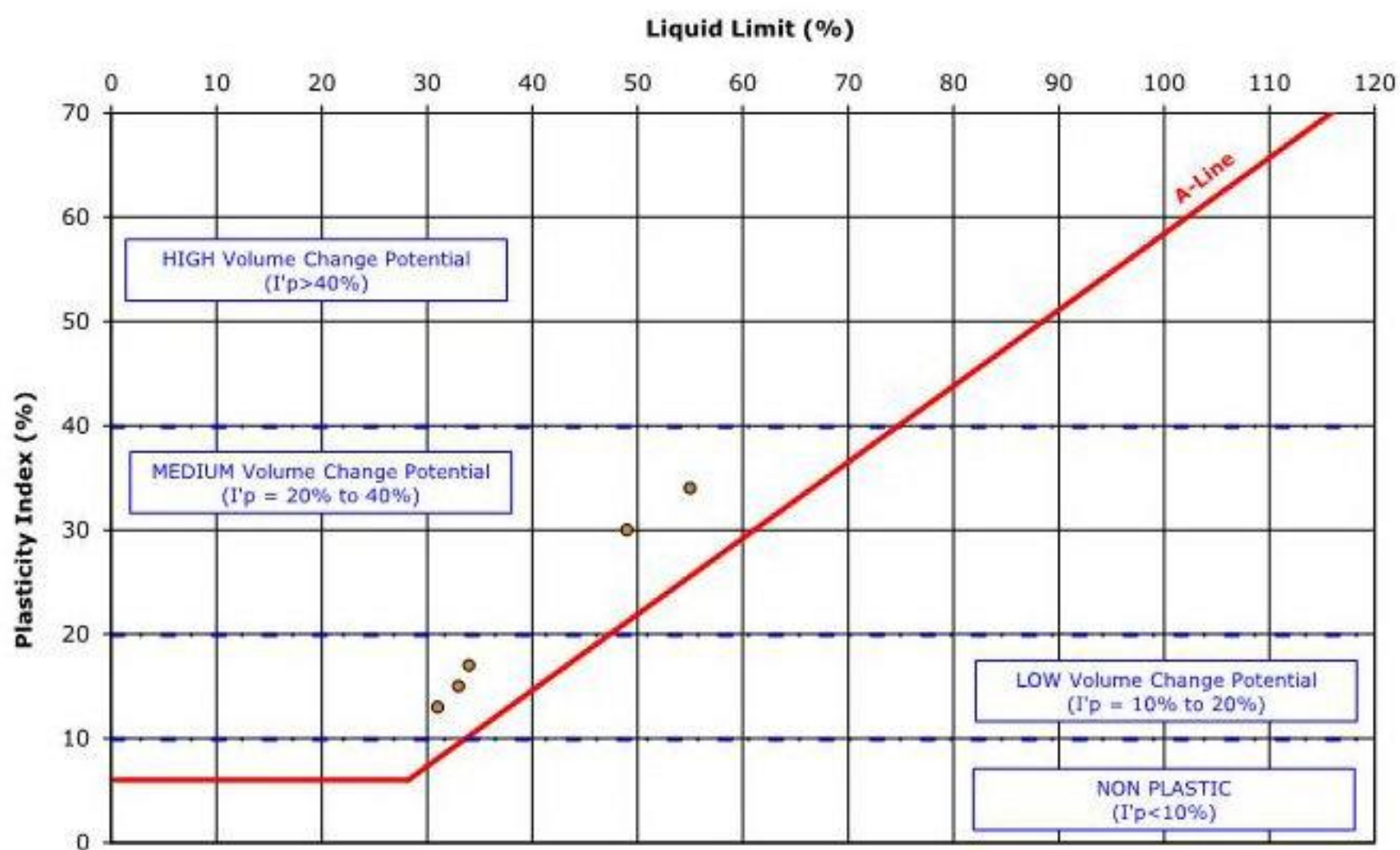
Plasticity Chart



M - SILT [plots below the A-Line]
C - CLAY [plots above the A-Line]

Classification in accordance with BS5930:2015 "Code of practice for site investigations"

Plasticity Chart



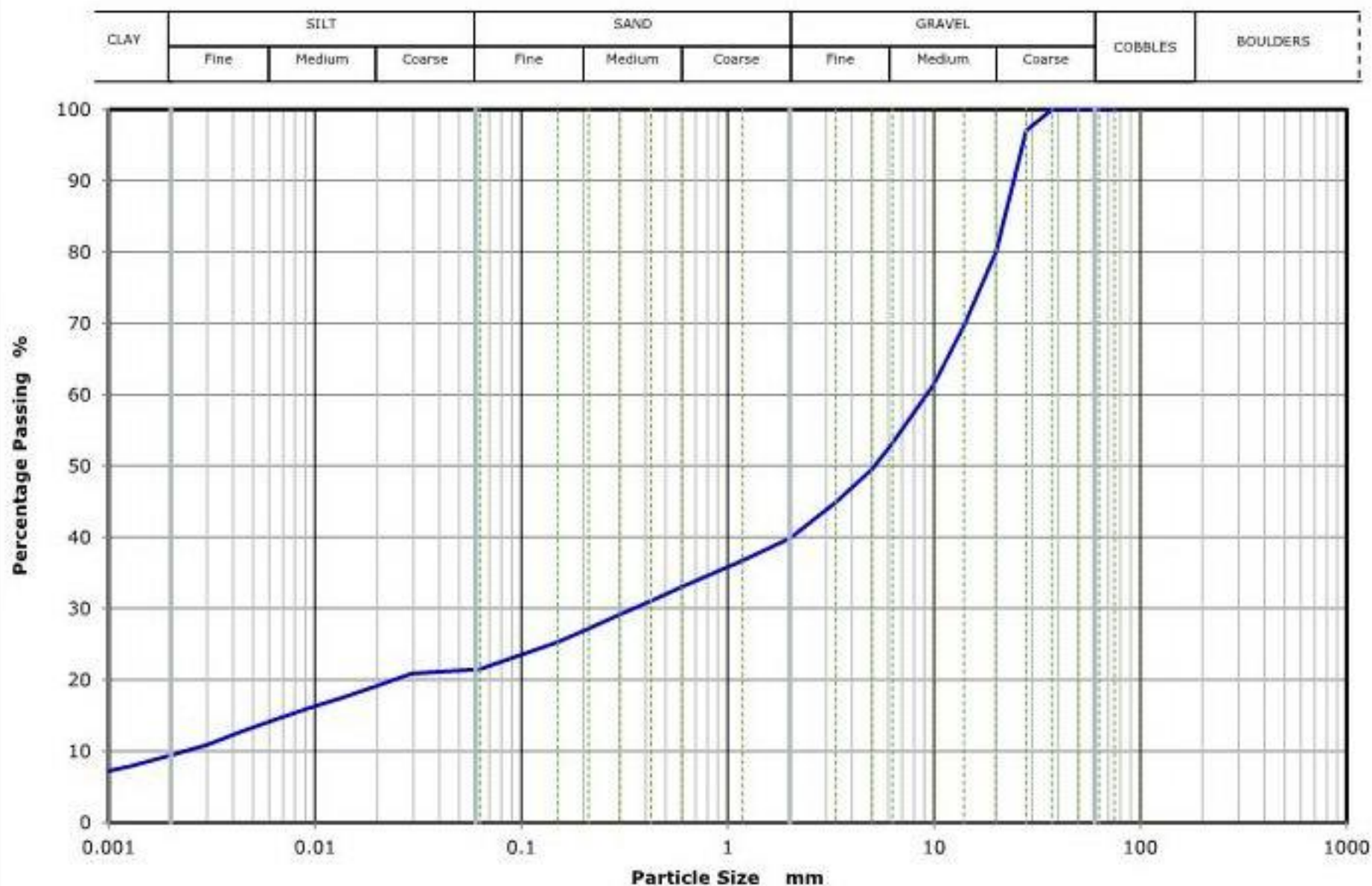
Modified Plasticity Index, I'_p :

$$I'_p = \frac{I_p \times (\% \text{ passing } 425\text{mm})}{100\%} \quad (\text{where } I_p = \text{Plasticity Index})$$

Classification in accordance with NHBC Standards, Part 4 'Foundations', Chapter 4.2 'Building near trees'

PARTICLE SIZE DISTRIBUTION

Hole ID: BH102	Description: Brown clayey silty sandy GRAVEL
Depth (m): 2.00	



Sieving	
Size (mm)	% passing
75	100.0
63	100.0
50	100.0
37.5	100.0
28	97.1
20	80.0
14	69.7
10	61.5
6.3	53.2
5	49.5
3.35	45.0
2	39.9
1.18	36.7
0.6	33.0
0.425	31.1
0.3	29.2
0.212	27.2
0.15	25.3
0.063	21.5

Sedimentation	
Size (μm)	% passing
29.3	20.9
20.1	19.2
13.7	17.5
9.4	16.1
6.4	14.4
4.4	12.8
3.0	10.9
2.0	9.42
1.3	7.97
0.9	6.93
0.3	2.56

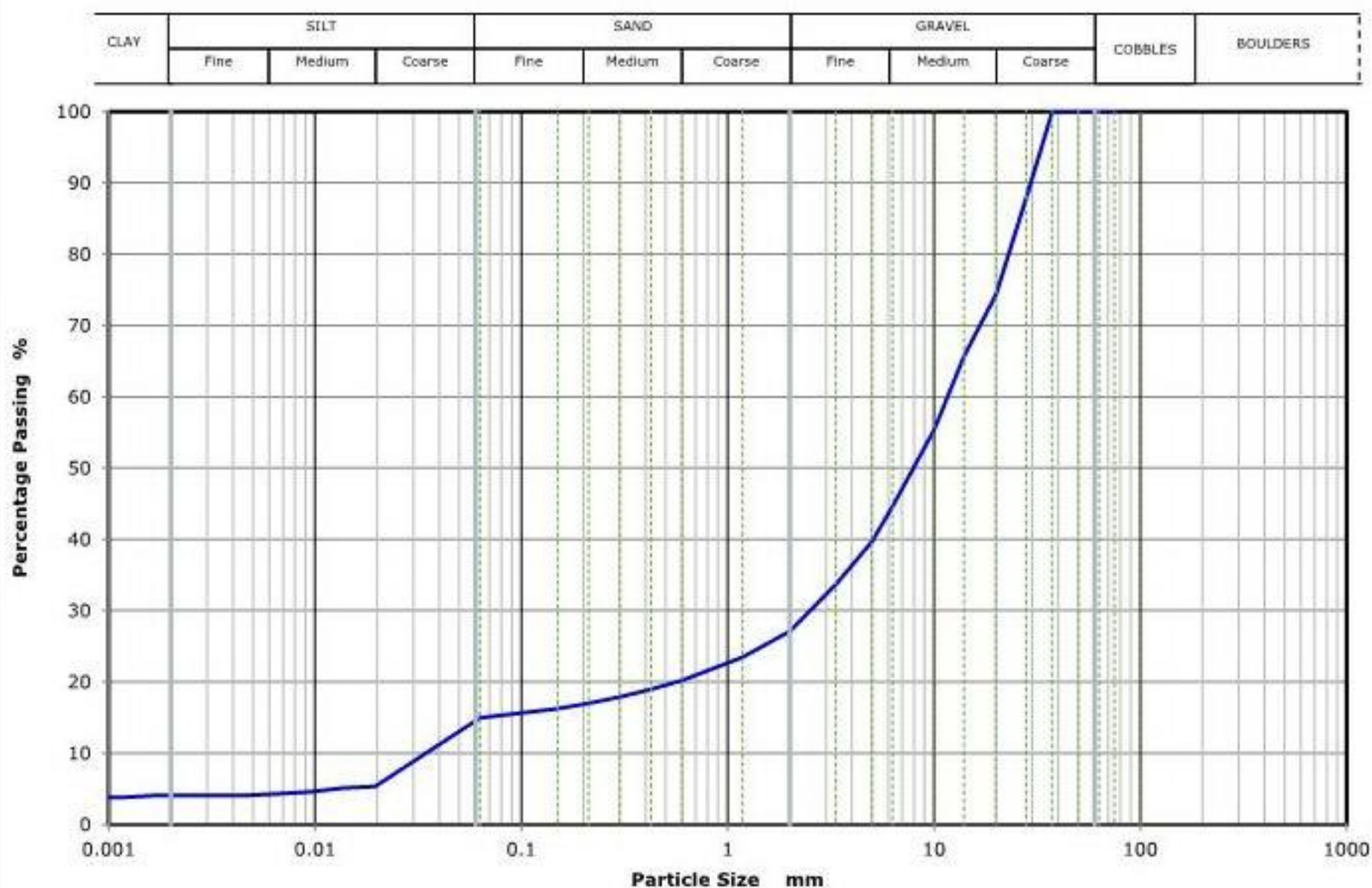
Sample proportions	%
Cobbles	0
Gravel	60
Sand	18
Silt	14
Clay	8

Grading analysis		
D60	mm	9.19
D30	mm	0.349
D10	mm	0.002
Uniformity Coefficient		3910.0
Curvature Coefficient		5.6

Test method and date	
Testing in accordance with BS EN ISO 17892:	
- Wet sieving method	
- Hydrometer method	
Reporting date:	07 Jun 19

PARTICLE SIZE DISTRIBUTION

Hole ID: BH105	Description: Brown slightly clayey, silty sandy GRAVEL
Depth (m): 2.50	



Sieving	
Size (mm)	% passing
75	100.0
63	100.0
50	100.0
37.5	100.0
28	87.9
20	74.4
14	65.7
10	55.4
6.3	44.6
5	39.7
3.35	33.7
2	27.1
1.18	23.5
0.6	20.2
0.425	19.0
0.3	17.9
0.212	17.0
0.15	16.2
0.063	15.0

Sedimentation	
Size (μm)	% passing
19.5	5.34
13.6	5.09
9.4	4.59
6.6	4.33
4.6	4.08
3.4	4.08
2.4	4.08
1.7	4.08
1.2	3.83
0.8	3.83
0.3	3.33

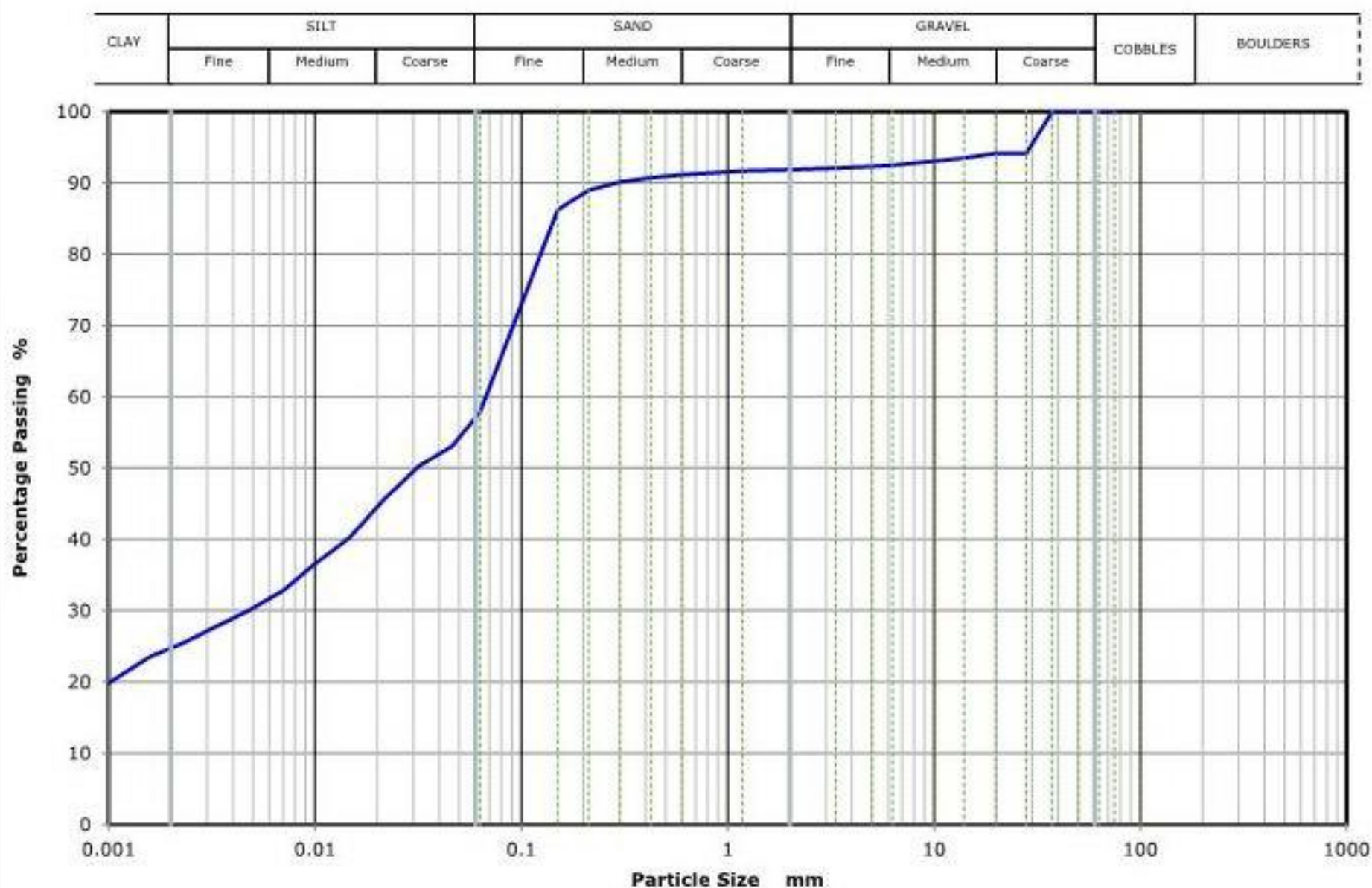
Sample proportions	%
Cobbles	0
Gravel	73
Sand	12
Silt	11
Clay	4

Grading analysis		
D60	mm	11.63
D30	mm	2.505
D10	mm	0.034
Uniformity Coefficient		337.8
Curvature Coefficient		15.7

Test method and date	
Testing in accordance with BS EN ISO 17892:	
- Wet sieving method	
- Hydrometer method	
Reporting date:	07 Jun 19

PARTICLE SIZE DISTRIBUTION

Hole ID: BH107	Description: Brown slightly gravelly, slightly sandy and slightly silty CLAY
Depth (m): 2.30	



Sieving	
Size (mm)	% passing
75	100.0
63	100.0
50	100.0
37.5	100.0
28	94.2
20	94.2
14	93.5
10	93.0
6.3	92.5
5	92.3
3.35	92.1
2	91.9
1.18	91.7
0.6	91.1
0.425	90.8
0.3	90.1
0.212	89.0
0.15	86.2
0.063	57.8

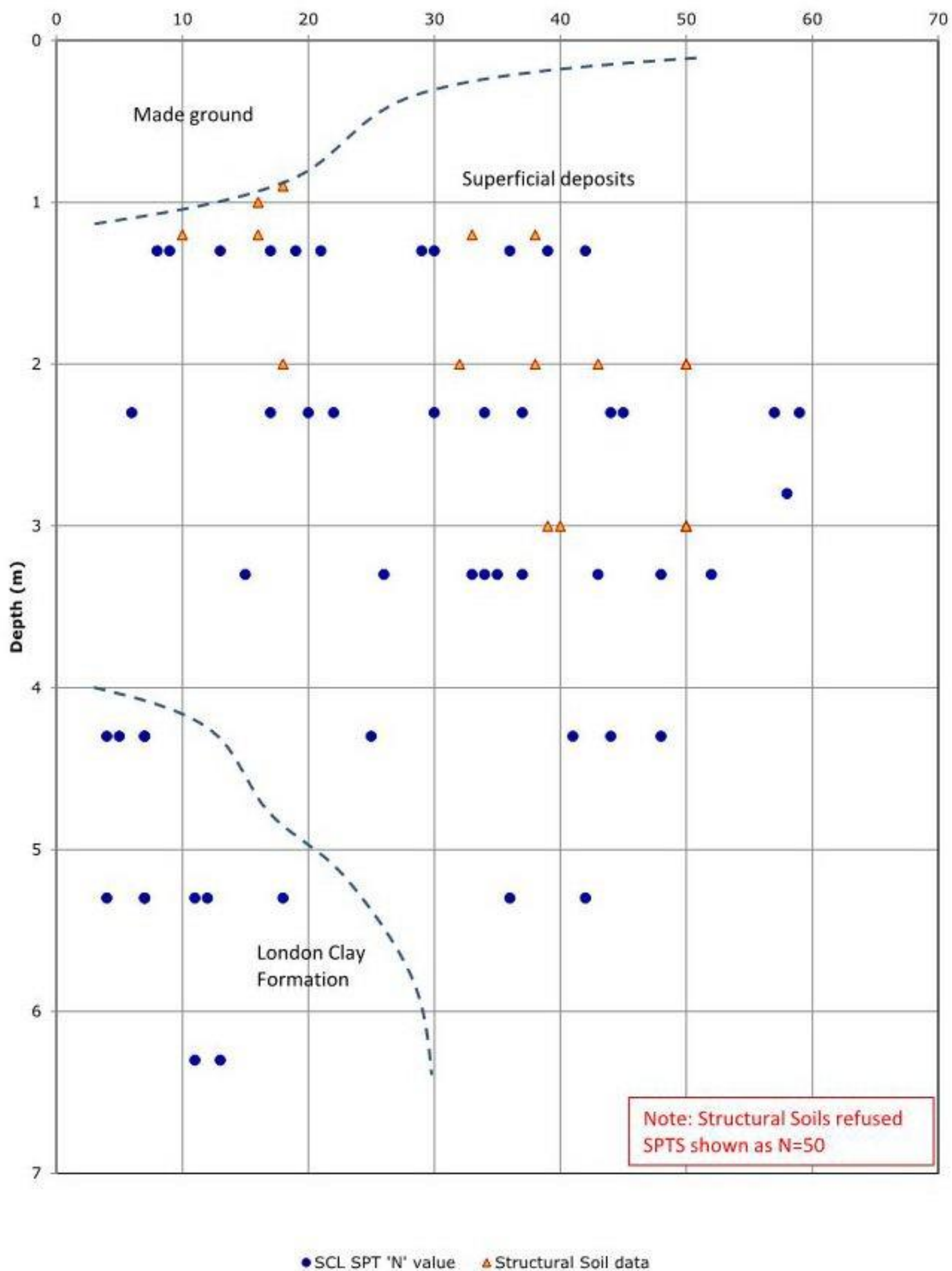
Sedimentation	
Size (μm)	% passing
46.1	53.1
31.9	50.3
21.7	45.7
14.6	40.2
9.9	36.5
7.0	32.8
4.8	30.1
3.3	27.8
2.3	25.5
1.6	23.6
0.6	15.8

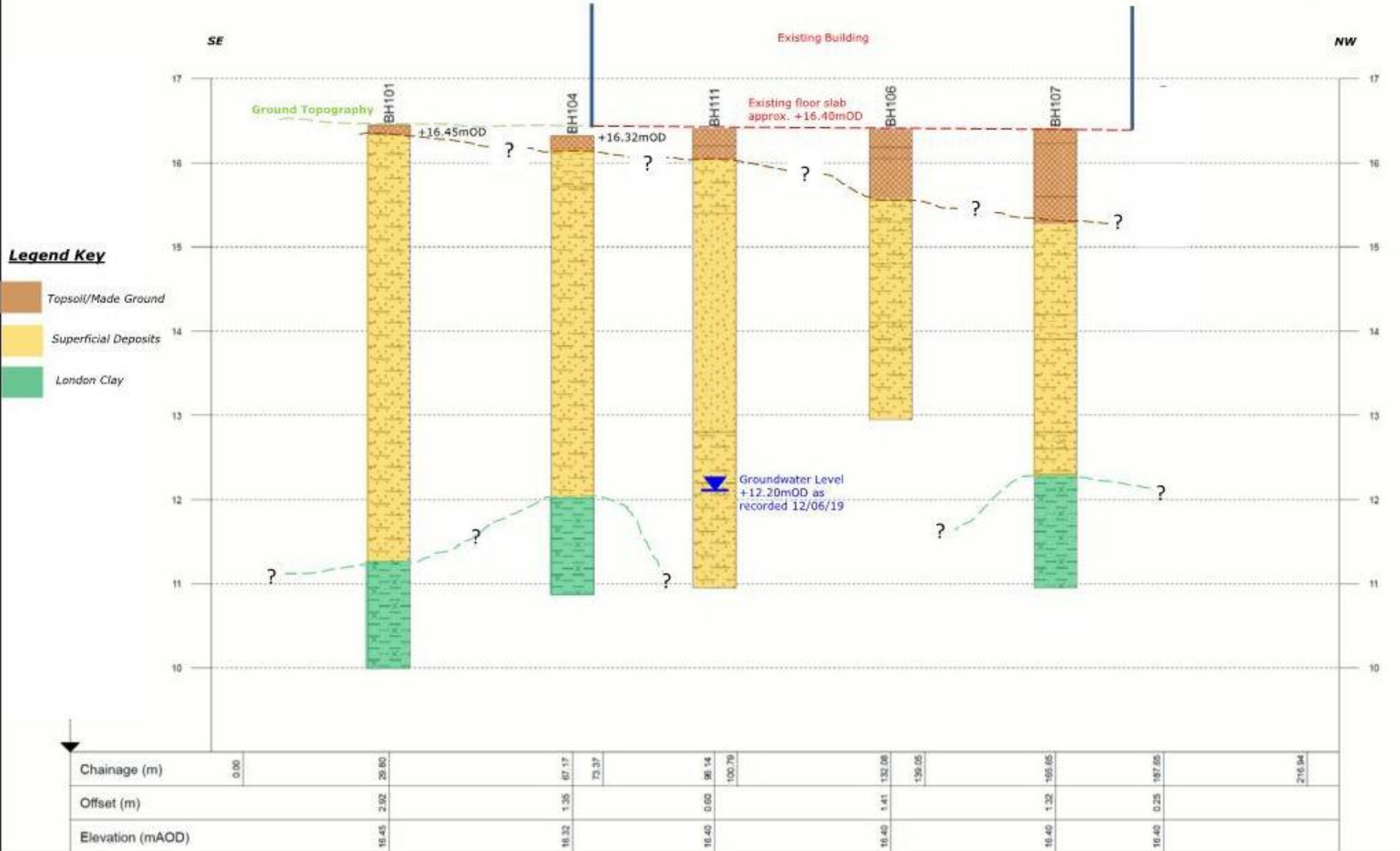
Sample proportions	%
Cobbles	0
Gravel	8
Sand	34
Silt	34
Clay	24

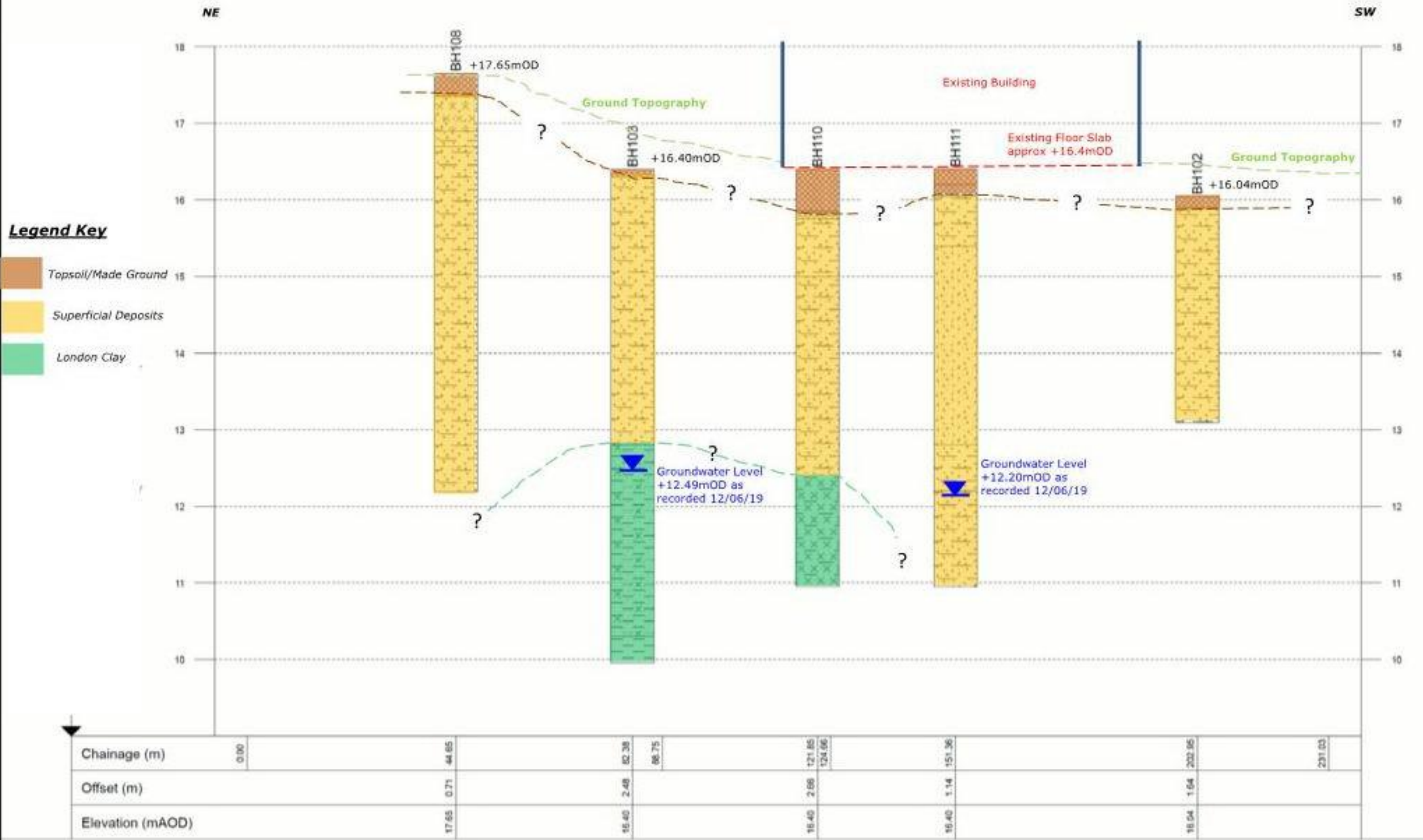
Grading analysis		
D60	mm	0.07
D30	mm	0.005
D10	mm	N/A
Uniformity Coefficient		
Curvature Coefficient		

Test method and date	
Testing in accordance with BS EN ISO 17892:	
- Wet sieving method	
- Hydrometer method	
Reporting date:	07 Jun 19

SPT-N vs depth







FOREWORD TO CONTAMINATION TESTING AND ASSESSMENT

The following statements are designed to inform and guide the Client and other potential parties intending to rely upon this report, with the express intent of protecting them from misunderstanding as to the extent and thus the potential associated risks that may result from proceeding without further evaluations or guidance.

- 1) Unless otherwise stated in this report, the testing of soils and waters is based on a range of commonly occurring potential contaminants for the specific purpose of providing a general guidance evaluation for the proposed form of development. Thus, the range of potential contaminants is neither exhaustive nor specifically targeted to any previous known uses or influences upon the site.
- 2) The amount and scope of the testing should not be assumed to be exhaustive but has been selected, at this stage, to provide a reasonable, general view of the site ground conditions. In many cases this situation is quite sufficient for the site to be characterised for the purposes of development and related Health and Safety matters for persons involved in or directly affected by the site development works. It must be understood, however, that in certain circumstances aspects or areas of the site may require further investigation and testing in order to fully clarify and characterise contamination issues, both for regulatory compliance and for commercial reasons.
- 3) The scope of the contamination testing must not automatically be regarded as being sufficient to fully formulate a remediation scheme. For such a scheme it may be necessary to consider further testing to verify the effectiveness of the remedial work after the site has been treated. It must be understood that a remediation scheme which brings a site into a sufficient state for the proposed development ("fit for purpose") under current legislation and published guidance, may result in some contamination being left in-situ. It is possible that forthcoming legislation may result in a site being classified by the Local Authority and assigned a "Degree of Risk" related to previous use or known contamination.
- 4) The scope of the environmental investigation and contamination testing must not be automatically regarded as sufficient to satisfy the requirements in the wider environmental setting. The risks to adjacent properties and to the water environment are assessed by the regulatory authorities and there may be a requirement to carry out further exploration, testing and, possibly monitoring in the short or long term. It is not possible to sensibly predict the nature and extent of such additional requirements as these are the direct result of submissions to and liaison with the regulatory authorities. It is imperative, therefore, that such submissions and contacts are made as soon as possible, especially if there are perceived to be critical features of the site and proposed scheme, in this context.
- 5) New testing criteria have been implemented by the Environment Agency to enable a waste disposal classification to be made. The date of implementation of this Waste Acceptance Criteria (WAC) was July 2005. It is this testing that will be used by the waste regulatory authorities, including waste disposal sites, to designate soils for disposal in landfill sites. In certain circumstances, to satisfy the waste regulations, there may be the necessity to carry out additional testing to clarify and confirm the nature of any contamination that may be present. If commercial requirements are significant then this process may also necessitate further field operations to clarify the extent of certain features. Thus, the waste classification must be obtained from the waste regulation authorities or a licensed waste disposal site and we strongly recommend that this classification is obtained as soon as possible and certainly prior to establishing any costings or procedures for this or related aspects of the scheme.



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Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 19-06884

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: 10383/OT

Sample Receipt Date: 16/05/2019

Sample Scheduled Date: 16/05/2019

Report Issue Number: 1

Reporting Date: 22/05/2019

Authorised by:



Deputy Quality Manager

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Lenham Heath
Maidstone
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Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19	14/05/19	14/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH101	BH101	BH102	BH102
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 10383/OT	Depth (m)	0.05	0.15	1.00	0.10	0.50
Reporting Date: 22/05/2019	DETS Sample No	408654	408655	408656	408658	408659

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected		Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.6	7.5	7.6	7.3	7.4
Electrical Conductivity	uS/cm	< 5	NONE	163	115		160	117
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2		< 2	< 2
Total Sulphate as SO ₄	mg/kg	< 200	NONE	504	397	507	437	336
Total Sulphate as SO ₄	%	< 0.02	NONE	0.05	0.04	0.05	0.04	0.03
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	51	16	22	< 10	14
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.02	0.02	< 0.01	0.01
Total Sulphur	%	< 0.02	NONE	0.04	0.02	< 0.02	0.02	< 0.02
Organic Matter	%	< 0.1	MCERTS	4.1	1.6		2.9	1.3
Arsenic (As)	mg/kg	< 2	MCERTS	12	14		7	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1		< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.4	0.3		0.4	0.7
Chromium (Cr)	mg/kg	< 2	MCERTS	25	27		16	140
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2		< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	41	20		20	19
Lead (Pb)	mg/kg	< 3	MCERTS	43	30		93	22
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1		< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	24	27		12	27
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3		< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	161	74		67	58
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2		< 2	< 2
EPH (C10 - C40)	mg/kg	< 6	MCERTS	3280	784		80	< 6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.
Subcontracted analysis (S)

Soil Analysis Certificate						
DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19	14/05/19	
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH102	BH103	BH103	BH103	
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 10383/OT	Depth (m)	1.00	0.10	0.50	2.00	
Reporting Date: 22/05/2019	DETS Sample No	408660	408661	408662	408663	

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025		Not Detected	Not Detected	
pH	pH Units	N/a	MCERTS	7.6	7.6	7.6	7.5
Electrical Conductivity	uS/cm	< 5	NONE		140	137	
Total Cyanide	mg/kg	< 2	NONE		< 2	< 2	
Total Sulphate as SO ₄	mg/kg	< 200	NONE	359	2645	1157	689
Total Sulphate as SO ₄	%	< 0.02	NONE	0.04	0.26	0.12	0.07
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10	24	50	48
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01	0.02	0.05	0.05
Total Sulphur	%	< 0.02	NONE	< 0.02	0.08	0.05	0.03
Organic Matter	%	< 0.1	MCERTS		0.7	1.1	
Arsenic (As)	mg/kg	< 2	MCERTS		55	46	
W/S Boron	mg/kg	< 1	NONE		< 1	1.5	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS		2.9	3	
Chromium (Cr)	mg/kg	< 2	MCERTS		11	28	
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS		11	17	
Lead (Pb)	mg/kg	< 3	MCERTS		106	79	
Mercury (Hg)	mg/kg	< 1	NONE		< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS		18	30	
Selenium (Se)	mg/kg	< 3	NONE		< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS		660	379	
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2	< 2	
EPH (C10 - C40)	mg/kg	< 6	MCERTS		149	17	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.
Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19	14/05/19	14/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH101	BH102	BH102	BH103
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 10383/OT	Depth (m)	0.05	0.15	0.10	0.50	0.10
Reporting Date: 22/05/2019	DETS Sample No	408654	408655	408658	408659	408661

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	0.92	0.18	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	0.72	0.17	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	7.73	2.07	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	9.98	2.60	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	96.30	22.20	0.12	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	26.90	5.66	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	142	28.20	0.26	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	88.30	19.90	0.22	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	58.30	11.80	0.16	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	52.20	11.60	0.17	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	54.90	12.70	0.27	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	17.50	3.36	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	40	6.98	0.18	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	22.50	3.88	0.14	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	3.50	1.15	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	19.70	3.22	0.14	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	641	136	1.7	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.



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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 19-06884	Date Sampled	14/05/19				
Soil Consultants Ltd	Time Sampled	None Supplied				
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH103				
Project / Job Ref: 10383/OT	Additional Refs	None Supplied				
Order No: 10383/OT	Depth (m)	0.50				
Reporting Date: 22/05/2019	DETS Sample No	408662				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19	14/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH102	BH103	BH103
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 10383/OT	Depth (m)	0.15	0.50	0.10	0.50
Reporting Date: 22/05/2019	DETS Sample No	408655	408659	408661	408662

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	4	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	32	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	88	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	124	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	124	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19	14/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH102	BH103	BH103
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 10383/OT	Depth (m)	0.15	0.50	0.10	0.50
Reporting Date: 22/05/2019	DETS Sample No	408655	408659	408661	408662

Determinand	Unit	RL	Accreditation				
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - PCB (7 Congeners)

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19	14/05/19		
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH102	BH103		
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 10383/OT	Depth (m)	0.15	0.50	0.50		
Reporting Date: 22/05/2019	DETS Sample No	408655	408659	408662		

Determinand	Unit	RL	Accreditation					
PCB Congener 28	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 52	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 101	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 118	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 138	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 153	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 180	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
Total PCB (7 Congeners)	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30 °C



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Water Analysis Certificate

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	ISO17025	7.3	6.9			
Electrical Conductivity	uS/cm	< 5	NONE	563	936			
Total Cyanide	ug/l	< 5	NONE	< 5	< 5			
Sulphate as SO ₄	mg/l	< 1	ISO17025	18	37			
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	20.3	8.3			
Arsenic (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Boron (dissolved)	ug/l	< 5	ISO17025	31	67			
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4	< 0.4			
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Chromium (hexavalent)	ug/l	< 20	NONE	< 20	< 20			
Copper (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Lead (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Mercury (dissolved)	ug/l	< 0.05	ISO17025	< 0.05	< 0.05			
Nickel (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5			
Zinc (dissolved)	ug/l	< 2	ISO17025	< 2	2			
Total Phenols (monohydric)	ug/l	< 10	NONE	< 10	< 10			
EPH (C10 - C40)	ug/l	< 10	NONE	< 10	61			

Subcontracted analysis ^{OS}
Insufficient sample ^{IG}
Unsuitable Sample ^{US}



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Water Analysis Certificate - Speciated PAH

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation					
Naphthalene	ug/l	< 0.01	NONE	0.29	< 0.01			
Acenaphthylene	ug/l	< 0.01	NONE	0.01	< 0.01			
Acenaphthene	ug/l	< 0.01	NONE	0.94	< 0.01			
Fluorene	ug/l	< 0.01	NONE	0.94	0.01			
Phenanthrene	ug/l	< 0.01	NONE	2.59	0.04			
Anthracene	ug/l	< 0.01	NONE	0.36	< 0.01			
Fluoranthene	ug/l	< 0.01	NONE	0.34	< 0.01			
Pyrene	ug/l	< 0.01	NONE	0.15	< 0.01			
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Chrysene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	ug/l	0.008	NONE	< 0.008	< 0.008			
Total EPA-16 PAHs	ug/l	< 0.01	NONE	5.62	0.05			



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Water Analysis Certificate - TPH CWG Banded					
DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19		
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied		
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103		
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied		
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied		
Reporting Date: 22/05/2019	DETS Sample No	408657	408664		

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10	< 10			
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10	< 10			
Aliphatic >C8 - C10	ug/l	< 10	NONE	< 10	35			
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10	14			
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10			
Aliphatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10			
Aliphatic >C21 - C34	ug/l	< 10	NONE	< 10	< 10			
Aliphatic (C5 - C34)	ug/l	< 70	NONE	< 70	< 70			
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10			
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10	< 10			
Aromatic (C5 - C35)	ug/l	< 70	NONE	< 70	< 70			
Total >C5 - C35	ug/l	< 140	NONE	< 140	< 140			



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Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation					
Benzene	ug/l	< 1	ISO17025	< 1	< 1			
Toluene	ug/l	< 5	ISO17025	< 5	< 5			
Ethylbenzene	ug/l	< 5	ISO17025	< 5	< 5			
p & m-xylene	ug/l	< 10	ISO17025	< 10	< 10			
o-xylene	ug/l	< 5	ISO17025	< 5	< 5			
MTBE	ug/l	< 10	ISO17025	< 10	< 10			



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Water Analysis Certificate - Volatile Organic Compounds (VOC)

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation			
Dichlorodifluoromethane	ug/l	< 5	ISO17025	< 5	< 5	
Vinyl Chloride	ug/l	< 5	ISO17025	< 5	< 5	
Chloromethane	ug/l	< 5	ISO17025	< 5	< 5	
Chloroethane	ug/l	< 5	ISO17025	< 5	< 5	
Bromomethane	ug/l	< 5	ISO17025	< 5	< 5	
Trichlorofluoromethane	ug/l	< 5	ISO17025	< 5	< 5	
1,1-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	
MTBE	ug/l	< 10	ISO17025	< 10	< 10	
trans-1,2-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	
1,1-Dichloroethane	ug/l	< 5	ISO17025	< 5	< 5	
cis-1,2-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	
2,2-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	
Chloroform	ug/l	< 5	ISO17025	< 5	< 5	
Bromochloromethane	ug/l	< 10	ISO17025	< 10	< 10	
1,1,1-Trichloroethane	ug/l	< 5	ISO17025	< 5	< 5	
1,1-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	
Carbon Tetrachloride	ug/l	< 5	ISO17025	< 5	< 5	
1,2-Dichloroethane	ug/l	< 10	ISO17025	< 10	< 10	
Benzene	ug/l	< 1	ISO17025	< 1	< 1	
1,2-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	
Trichloroethene	ug/l	< 5	ISO17025	< 5	< 5	
Bromodichloromethane	ug/l	< 5	ISO17025	< 5	< 5	
Dibromomethane	ug/l	< 5	ISO17025	< 5	< 5	
TAME	ug/l	< 5	ISO17025	< 5	< 5	
cis-1,3-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	
Toluene	ug/l	< 5	ISO17025	< 5	< 5	
trans-1,3-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	
1,1,2-Trichloroethane	ug/l	< 10	ISO17025	< 10	< 10	
1,3-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	
Tetrachloroethene	ug/l	< 5	ISO17025	< 5	< 5	
Dibromochloromethane	ug/l	< 5	ISO17025	< 5	< 5	
1,2-Dibromoethane	ug/l	< 5	ISO17025	< 5	< 5	
Chlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,1,1,2-Tetrachloroethane	ug/l	< 5	ISO17025	< 5	< 5	
Ethyl Benzene	ug/l	< 5	ISO17025	< 5	< 5	
m,p-Xylene	ug/l	< 10	ISO17025	< 10	< 10	
o-Xylene	ug/l	< 5	ISO17025	< 5	< 5	
Styrene	ug/l	< 5	ISO17025	< 5	< 5	
Bromoform	ug/l	< 10	ISO17025	< 10	< 10	
Isopropylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,1,2,2-Tetrachloroethane	ug/l	< 10	ISO17025	< 10	< 10	
1,2,3-Trichloropropane	ug/l	< 5	ISO17025	< 5	< 5	
n-Propylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
Bromobenzene	ug/l	< 5	ISO17025	< 5	< 5	
2-Chlorotoluene	ug/l	< 5	ISO17025	< 5	< 5	
1,3,5-Trimethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
4-Chlorotoluene	ug/l	< 5	ISO17025	< 5	< 5	
tert-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,2,4-Trimethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
sec-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
p-Isopropyltoluene	ug/l	< 5	ISO17025	< 5	< 5	
1,3-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,4-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	
n-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,2-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	
1,2-Dibromo-3-chloropropane	ug/l	< 10	ISO17025	< 10	< 10	
Hexachlorobutadiene	ug/l	< 5	ISO17025	< 5	< 5	



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Water Analysis Certificate - Semi Volatile Organic Compounds (SVOC)

DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation			
Phenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
1,2,4-Trichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2-Nitrophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Nitrobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
0-Cresol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
bis(2-chloroethoxy)methane	ug/l	< 0.1	NONE	< 0.1	< 0.1	
bis(2-chloroethyl)ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,4-Dichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2-Chlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
1,3-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
1,4-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
1,2-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,4-Dimethylphenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Isophorone	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Hexachloroethane	ug/l	< 0.1	NONE	< 0.1	< 0.1	
p-Cresol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,4,6-Trichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,4,5-Trichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Chloro-3-methylphenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2-Methylnaphthalene	ug/l	< 0.1	NONE	0.2	< 0.1	
Hexachlorocyclopentadiene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Hexachlorobutadiene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,6-Dinitrotoluene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Dimethyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2-Chloronaphthalene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Chloroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Nitrophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Chlorophenyl phenyl ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	
3-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	
4-Bromophenyl phenyl ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Hexachlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
2,4-Dinitrotoluene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Diethyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Dibenzofuran	ug/l	< 0.1	NONE	0.6	< 0.1	
Azobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Dibutyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Carbazole	ug/l	< 0.1	NONE	2.3	< 0.1	
bis(2-ethylhexyl)phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Benzyl butyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	
Di-n-octyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	



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Water Analysis Certificate - PCB (7 Congeners)						
DETS Report No: 19-06884	Date Sampled	14/05/19	14/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH101	BH103			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: 10383/OT	Depth (m)	None Supplied	None Supplied			
Reporting Date: 22/05/2019	DETS Sample No	408657	408664			

Determinand	Unit	RL	Accreditation					
PCB Congener 28	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 52	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 101	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 118	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 138	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 153	ug/l	< 0.1	NONE	< 0.1	< 0.1			
PCB Congener 180	ug/l	< 0.1	NONE	< 0.1	< 0.1			
Total PCB (7 Congeners)	ug/l	< 0.7	NONE	< 0.7	< 0.7			



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 19-06884

Soil Consultants Ltd

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: 10383/OT

Reporting Date: 22/05/2019

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
408654	BH101	None Supplied	0.05	5.4	Black loamy sand with stones and chalk
408655	BH101	None Supplied	0.15	7	Brown sandy clay with stones
408656	BH101	None Supplied	1.00	3.6	Brown loamy sand with stones and chalk
408658	BH102	None Supplied	0.10	5.3	Brown sandy clay with stones and vegetation
408659	BH102	None Supplied	0.50	5.4	Brown sandy gravel with stones and vegetation
408660	BH102	None Supplied	1.00	4.1	Brown sandy gravel with stones and chalk
408661	BH103	None Supplied	0.10	4.1	Brown sandy clay with stones and concrete
408662	BH103	None Supplied	0.50	6.2	Brown sandy clay with stones
408663	BH103	None Supplied	2.00	2.6	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-06884

Soil Consultants Ltd

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: 10383/OT

Reporting Date: 22/05/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphénylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-06884

Soil Consultants Ltd

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: 10383/OT

Reporting Date: 22/05/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (all: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (all: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered



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DETS Report No: 19-07779

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: None Supplied

Sample Receipt Date: 03/06/2019

Sample Scheduled Date: 03/06/2019

Report Issue Number: 1

Reporting Date: 07/06/2019

Authorized by:



Dave Ashworth
Deputy Quality Manager

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Soil Analysis Certificate						
DETS Report No: 19-07779	Date Sampled	24/05/19	24/05/19	23/05/19	23/05/19	23/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107	BH107	BH108	BH108	BH104
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.80	0.30	0.80	0.40
Reporting Date: 07/06/2019	DETS Sample No	412046	412047	412048	412049	412050

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.3	7.2	7.9	7.8	7.9
Electrical Conductivity	uS/cm	< 5	NONE	454	462	125	38	75
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Total Sulphate as SO ₄	mg/kg	< 200	NONE	2233	1466	276	< 200	234
Total Sulphate as SO ₄	%	< 0.02	NONE	0.22	0.15	0.03	< 0.02	0.02
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	690	747	22	11	14
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.69	0.75	0.02	0.01	0.01
Total Sulphur	%	< 0.02	NONE	0.11	0.05	< 0.02	< 0.02	< 0.02
Organic Matter	%	< 0.1	MCERTS	0.7	1	1.8	0.9	0.5
Arsenic (As)	mg/kg	< 2	MCERTS	11	8	8	10	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.7	0.2	0.6	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	22	20	25	26	28
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	25	15	16	17	16
Lead (Pb)	mg/kg	< 3	MCERTS	139	41	26	16	16
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	24	13	13	17	22
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	93	47	460	143	64
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
EPH (C10 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	< 6	19

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 19-07779	Date Sampled	23/05/19	24/05/19	24/05/19	24/05/19	24/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH104	BH109	BH109	BH109	BH111
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	1.00	0.30	0.50	1.50	2.70
Reporting Date: 07/06/2019	DETS Sample No	412051	412052	412053	412054	412055

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025		Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	7.6	7.9	7.6	8.2	8.6
Electrical Conductivity	uS/cm	< 5	NONE		399	386		
Total Cyanide	mg/kg	< 2	NONE		< 2	< 2		
Total Sulphate as SO ₄	mg/kg	< 200	NONE	251	681	487	401	< 200
Total Sulphate as SO ₄	%	< 0.02	NONE	0.03	0.07	0.05	0.04	< 0.02
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	14	127	75	17	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.01	0.13	0.08	0.02	< 0.01
Total Sulphur	%	< 0.02	NONE	< 0.02	0.03	< 0.02	< 0.02	< 0.02
Organic Matter	%	< 0.1	MCERTS		0.8	0.9		
Arsenic (As)	mg/kg	< 2	MCERTS		13	15		
W/S Boron	mg/kg	< 1	NONE		< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS		< 0.2	0.6		
Chromium (Cr)	mg/kg	< 2	MCERTS		30	36		
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS		22	22		
Lead (Pb)	mg/kg	< 3	MCERTS		51	20		
Mercury (Hg)	mg/kg	< 1	NONE		< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS		21	32		
Selenium (Se)	mg/kg	< 3	NONE		< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS		58	78		
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2	< 2		
EPH (C10 - C40)	mg/kg	< 6	MCERTS		< 6	< 6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 19-07779	Date Sampled	23/05/19				
Soil Consultants Ltd	Time Sampled	None Supplied				
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH110				
Project / Job Ref: 10383/OT	Additional Refs	None Supplied				
Order No: None Supplied	Depth (m)	2.00				
Reporting Date: 07/06/2019	DETS Sample No	412056				

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025				
pH	pH Units	N/a	MCERTS	8.7			
Electrical Conductivity	uS/cm	< 5	NONE				
Total Cyanide	mg/kg	< 2	NONE				
Total Sulphate as SO ₄	mg/kg	< 200	NONE	395			
Total Sulphate as SO ₄	%	< 0.02	NONE	0.04			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01			
Total Sulphur	%	< 0.02	NONE	< 0.02			
Organic Matter	%	< 0.1	MCERTS				
Arsenic (As)	mg/kg	< 2	MCERTS				
W/S Boron	mg/kg	< 1	NONE				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS				
Chromium (Cr)	mg/kg	< 2	MCERTS				
Chromium (hexavalent)	mg/kg	< 2	NONE				
Copper (Cu)	mg/kg	< 4	MCERTS				
Lead (Pb)	mg/kg	< 3	MCERTS				
Mercury (Hg)	mg/kg	< 1	NONE				
Nickel (Ni)	mg/kg	< 3	MCERTS				
Selenium (Se)	mg/kg	< 3	NONE				
Zinc (Zn)	mg/kg	< 3	MCERTS				
Total Phenols (monohydric)	mg/kg	< 2	NONE				
EPH (C10 - C40)	mg/kg	< 6	MCERTS				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 19-07779	Date Sampled	24/05/19	24/05/19	23/05/19	23/05/19	23/05/19
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107	BH107	BH108	BH108	BH104
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.80	0.30	0.80	0.40
Reporting Date: 07/06/2019	DETS Sample No	412046	412047	412048	412049	412050

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.18	0.24	< 0.1	< 0.1	1.12
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.29
Fluoranthene	mg/kg	< 0.1	MCERTS	0.20	0.29	< 0.1	< 0.1	1.64
Pyrene	mg/kg	< 0.1	MCERTS	0.21	0.20	< 0.1	< 0.1	1.19
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.60
Chrysene	mg/kg	< 0.1	MCERTS	0.12	0.12	< 0.1	< 0.1	0.64
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.13	< 0.1	< 0.1	< 0.1	0.66
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.21
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.11	< 0.1	< 0.1	< 0.1	0.46
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.26
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.25
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	7.3

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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 19-07779	Date Sampled	24/05/19	24/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH109	BH109			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.30	0.50			
Reporting Date: 07/06/2019	DETS Sample No	412052	412053			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	0.43	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	0.47	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	0.39	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.23	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	0.25	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.30	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.22	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.15	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.16	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2.6	< 1.6			

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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-07779	Date Sampled	24/05/19	23/05/19	24/05/19		
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107	BH108	BH109		
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.80	0.80	0.30		
Reporting Date: 07/06/2019	DETS Sample No	412047	412049	412052		

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE

DETS Report No: 19-07779	Date Sampled	24/05/19	23/05/19	24/05/19		
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107	BH108	BH109		
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.80	0.80	0.30		
Reporting Date: 07/06/2019	DETS Sample No	412047	412049	412052		

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Soil Analysis Certificate - Volatile Organic Compounds (VOC)

DETS Report No: 19-07779	Date Sampled	24/05/19			
Soil Consultants Ltd	Time Sampled	None Supplied			
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107			
Project / Job Ref: 10383/OT	Additional Refs	None Supplied			
Order No: None Supplied	Depth (m)	0.80			
Reporting Date: 07/06/2019	DETS Sample No	412047			

Determinand	Unit	RL	Accreditation				
Dichlorodifluoromethane	ug/kg	< 5	MCERTS	< 5			
Vinyl Chloride	ug/kg	< 5	MCERTS	< 5			
Chloromethane	ug/kg	< 10	MCERTS	< 10			
Chloroethane	ug/kg	< 5	MCERTS	< 5			
Bromomethane	ug/kg	< 10	MCERTS	< 10			
Trichlorofluoromethane	ug/kg	< 5	MCERTS	< 5			
1,1-Dichloroethene	ug/kg	< 5	MCERTS	< 5			
MTBE	ug/kg	< 5	MCERTS	< 5			
trans-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5			
1,1-Dichloroethane	ug/kg	< 5	MCERTS	< 5			
cis-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5			
2,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5			
Chloroform	ug/kg	< 5	MCERTS	< 5			
Bromochloromethane	ug/kg	< 5	MCERTS	< 5			
1,1,1-Trichloroethane	ug/kg	< 5	MCERTS	< 5			
1,1-Dichloropropene	ug/kg	< 10	MCERTS	< 10			
Carbon Tetrachloride	ug/kg	< 5	MCERTS	< 5			
1,2-Dichloroethane	ug/kg	< 5	MCERTS	< 5			
Benzene	ug/kg	< 2	MCERTS	< 2			
1,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5			
Trichloroethene	ug/kg	< 5	MCERTS	< 5			
Bromodichloromethane	ug/kg	< 5	MCERTS	< 5			
Dibromomethane	ug/kg	< 5	MCERTS	< 5			
TAME	ug/kg	< 5	MCERTS	< 5			
cis-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5			
Toluene	ug/kg	< 5	MCERTS	< 5			
trans-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5			
1,1,2-Trichloroethane	ug/kg	< 10	MCERTS	< 10			
1,3-Dichloropropane	ug/kg	< 5	MCERTS	< 5			
Tetrachloroethene	ug/kg	< 5	MCERTS	< 5			
Dibromochloromethane	ug/kg	< 5	MCERTS	< 5			
1,2-Dibromoethane	ug/kg	< 5	MCERTS	< 5			
Chlorobenzene	ug/kg	< 5	MCERTS	< 5			
1,1,1,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5			
Ethyl Benzene	ug/kg	< 2	MCERTS	< 2			
m,p-Xylene	ug/kg	< 2	MCERTS	< 2			
o-Xylene	ug/kg	< 2	MCERTS	< 2			
Styrene	ug/kg	< 5	MCERTS	< 5			
Bromoform	ug/kg	< 10	MCERTS	< 10			
Isopropylbenzene	ug/kg	< 5	MCERTS	< 5			
1,1,2,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5			
1,2,3-Trichloropropane	ug/kg	< 5	MCERTS	< 5			
n-Propylbenzene	ug/kg	< 5	MCERTS	< 5			
Bromobenzene	ug/kg	< 5	MCERTS	< 5			
2-Chlorotoluene	ug/kg	< 5	MCERTS	< 5			
1,3,5-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5			
4-Chlorotoluene	ug/kg	< 5	MCERTS	< 5			
tert-Butylbenzene	ug/kg	< 5	MCERTS	< 5			
1,2,4-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5			
sec-Butylbenzene	ug/kg	< 5	MCERTS	< 5			
p-Isopropyltoluene	ug/kg	< 5	MCERTS	< 5			
1,3-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5			
1,4-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5			
n-Butylbenzene	ug/kg	< 5	MCERTS	< 5			
1,2-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5			
1,2-Dibromo-3-chloropropane	ug/kg	< 10	MCERTS	< 10			
Hexachlorobutadiene	ug/kg	< 5	MCERTS	< 5			

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Soil Analysis Certificate - Semi Volatile Organic Compounds (SVOC)

DETS Report No: 19-07779	Date Sampled	24/05/19				
Soil Consultants Ltd	Time Sampled	None Supplied				
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107				
Project / Job Ref: 10383/OT	Additional Refs	None Supplied				
Order No: None Supplied	Depth (m)	0.80				
Reporting Date: 07/06/2019	DETS Sample No	412047				

Determinand	Unit	RL	Accreditation				
Phenol	mg/kg	< 0.1	NONE	< 0.1			
1,2,4-Trichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
2-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1			
Nitrobenzene	mg/kg	< 0.1	MCERTS	< 0.1			
0-Cresol	mg/kg	< 0.1	NONE	< 0.1			
bis(2-chloroethoxy)methane	mg/kg	< 0.1	MCERTS	< 0.1			
bis(2-chloroethyl)ether	mg/kg	< 0.1	MCERTS	< 0.1			
2,4-Dichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1			
2-Chlorophenol	mg/kg	< 0.1	ISO17025	< 0.1			
1,3-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
1,4-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
1,2-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
2,4-Dimethylphenol	mg/kg	< 0.15	ISO17025	< 0.15			
Isophorone	mg/kg	< 0.1	NONE	< 0.1			
Hexachloroethane	mg/kg	< 0.1	MCERTS	< 0.1			
p-Cresol	mg/kg	< 0.15	MCERTS	< 0.15			
2,4,6-Trichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1			
2,4,5-Trichlorophenol	mg/kg	< 0.15	MCERTS	< 0.15			
2-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Chloro-3-methylphenol	mg/kg	< 0.1	NONE	< 0.1			
2-Methylnaphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Hexachlorocyclopentadiene	mg/kg	< 0.1	NONE	< 0.1			
Hexachlorobutadiene	mg/kg	< 0.1	ISO17025	< 0.1			
2,6-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1			
Dimethyl phthalate	mg/kg	< 0.1	NONE	< 0.1			
2-Chloronaphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
4-Chloroaniline	mg/kg	< 0.15	NONE	< 0.15			
4-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1			
4-Chlorophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1			
3-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Bromophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1			
Hexachlorobenzene	mg/kg	< 0.1	MCERTS	< 0.1			
2,4-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1			
Diethyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenzofuran	mg/kg	< 0.1	MCERTS	< 0.1			
Azobenzene	mg/kg	< 0.1	NONE	< 0.1			
Dibutyl phthalate	mg/kg	< 0.1	ISO17025	< 0.1			
Carbazole	mg/kg	< 0.1	ISO17025	< 0.1			
bis(2-ethylhexyl)phthalate	mg/kg	< 0.15	MCERTS	< 0.15			
Benzyl butyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			
Di-n-octyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - PCB (7 Congeners)

DETS Report No: 19-07779	Date Sampled	24/05/19	23/05/19	24/05/19		
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND	TP / BH No	BH107	BH104	BH109		
Project / Job Ref: 10383/OT	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.80	0.40	0.30		
Reporting Date: 07/06/2019	DETS Sample No	412047	412050	412052		

Determinand	Unit	RL	Accreditation					
PCB Congener 28	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 52	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 101	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 118	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 138	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 153	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
PCB Congener 180	mg/kg	0.008	NONE	< 0.008	< 0.008	< 0.008		
Total PCB (7 Congeners)	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2										
DETS Report No: 19-07779		Date Sampled	23/05/19					Landfill Waste Acceptance Criteria Limits		
Soil Consultants Ltd		Time Sampled	None Supplied					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND		TP / BH No	BH108							
Project / Job Ref: 10383/OT		Additional Refs	None Supplied							
Order No: None Supplied		Depth (m)	0.30							
Reporting Date: 07/06/2019		DETS Sample No	412048							
Determinand	Unit	MDL								
TOC ^{MU}	%	< 0.1	1					3%	5%	6%
Loss on Ignition	%	< 0.01	2.60					--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05					6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1					1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	< 10					500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7					100	--	--
pH ^{MU}	pH Units	N/a	7.9					--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1					--	To be evaluated	To be evaluated
Eluate Analysis			10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic ^U			< 0.01			< 0.1	0.5	2	25	
Barium ^U			< 0.02			< 0.2	20	100	300	
Cadmium ^U			< 0.0005			< 0.005	0.04	1	5	
Chromium ^U			< 0.005			< 0.05	0.5	10	70	
Copper ^U			< 0.01			< 0.1	2	50	100	
Mercury ^U			< 0.0005			< 0.01	0.01	0.2	2	
Molybdenum ^U			0.003			0.03	0.5	10	30	
Nickel ^U			< 0.007			< 0.07	0.4	10	40	
Lead ^U			< 0.005			< 0.05	0.5	10	50	
Antimony ^U			< 0.0060			< 0.06	0.06	0.7	5	
Selenium ^U			< 0.005			< 0.05	0.1	0.5	7	
Zinc ^U			0.009			0.09	4	50	200	
Chloride ^U			1			< 10	800	15000	25000	
Fluoride ^U			1.5			15	10	150	500	
Sulphate ^U			1			12	1000	20000	50000	
TDS			39			390	4000	60000	100000	
Phenol Index			< 0.01			< 0.1	1	-	-	
DOC			10.7			107	500	800	1000	
Leach Test Information										
Sample Mass (kg)			0.10							
Dry Matter (%)			89.4							
Moisture (%)			12							
Stage 1										
Volume Eluate L10 (litres)			0.89							
Results are expressed on a dry weight basis, after correction for moisture content where applicable										
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation										
M Denotes MCERTS accredited test										
U Denotes ISO17025 accredited test										

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2										
DETS Report No: 19-07779		Date Sampled	23/05/19					Landfill Waste Acceptance Criteria Limits		
Soil Consultants Ltd		Time Sampled	None Supplied					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND		TP / BH No	BH104							
Project / Job Ref: 10383/OT		Additional Refs	None Supplied							
Order No: None Supplied		Depth (m)	0.40							
Reporting Date: 07/06/2019		DETS Sample No	412050							
Determinand		Unit	MDL							
TOC ^{MU}		%	< 0.1	0.3	3%					
Loss on Ignition		%	< 0.01	2.30	--					
BTEX ^{MU}		mg/kg	< 0.05	< 0.05	6					
Sum of PCBs		mg/kg	< 0.1	< 0.1	1					
Mineral Oil ^{MU}		mg/kg	< 10	< 10	500					
Total PAH ^{MU}		mg/kg	< 1.7	7.3	100					
pH ^{MU}		pH Units	N/a	7.9	--					
Acid Neutralisation Capacity		mol/kg (+/-)	< 1	< 1	--					
Eluate Analysis				10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U			< 0.01			< 0.1	0.5	2	25	
Barium ^U			< 0.02			< 0.2	20	100	300	
Cadmium ^U			< 0.0005			< 0.005	0.04	1	5	
Chromium ^U			< 0.005			< 0.05	0.5	10	70	
Copper ^U			< 0.01			< 0.1	2	50	100	
Mercury ^U			< 0.0005			< 0.01	0.01	0.2	2	
Molybdenum ^U			< 0.001			< 0.01	0.5	10	30	
Nickel ^U			< 0.007			< 0.07	0.4	10	40	
Lead ^U			< 0.005			< 0.05	0.5	10	50	
Antimony ^U			< 0.0060			< 0.06	0.06	0.7	5	
Selenium ^U			< 0.005			< 0.05	0.1	0.5	7	
Zinc ^U			< 0.005			< 0.05	4	50	200	
Chloride ^U			1			12	800	15000	25000	
Fluoride ^U			< 0.5			< 5	10	150	500	
Sulphate ^U			1			11	1000	20000	50000	
TDS			56			560	4000	60000	100000	
Phenol Index			< 0.01			< 0.1	1	-	-	
DOC			6.7			67.1	500	800	1000	
Leach Test Information										
Sample Mass (kg)				0.10						
Dry Matter (%)				89.5						
Moisture (%)				11.8						
Stage 1										
Volume Eluate L10 (litres)				0.89						
Results are expressed on a dry weight basis, after correction for moisture content where applicable										
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation										
M Denotes MCERTS accredited test										
U Denotes ISO17025 accredited test										



DETS Ltd
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Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 19-07779

Soil Consultants Ltd

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: None Supplied

Reporting Date: 07/06/2019

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
412046	BH107	None Supplied	0.20	8.8	Brown sandy clay with stones and chalk
412047	BH107	None Supplied	0.80	11.3	Brown sandy clay with stones
\$ 412048	BH108	None Supplied	0.30	10.6	Brown sandy clay with stones and vegetation
\$ 412049	BH108	None Supplied	0.80	12.1	Brown sandy clay with stones
\$ 412050	BH104	None Supplied	0.40	10.6	Brown sandy clay with stones
\$ 412051	BH104	None Supplied	1.00	12	Light brown sandy clay with stones
412052	BH109	None Supplied	0.30	12	Brown sandy clay with stones and brick
412053	BH109	None Supplied	0.50	12.5	Brown sandy clay with stones and chalk
412054	BH109	None Supplied	1.50	9.3	Brown sandy clay with stones and chalk
412055	BH111	None Supplied	2.70	4	Brown sandy gravel with stones
\$ 412056	BH110	None Supplied	2.00	7.8	Orange sandy gravel with stones and chalk

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ¹⁵

& samples received in inappropriate containers for hydrocarbon analysis

\$ samples exceeded recommended holding times



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-07779

Soil Consultants Ltd

Site Reference: 38 New Lane, Havant, Hampshire, PO9 2ND

Project / Job Ref: 10383/OT

Order No: None Supplied

Reporting Date: 07/06/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1.5 diphenvicarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
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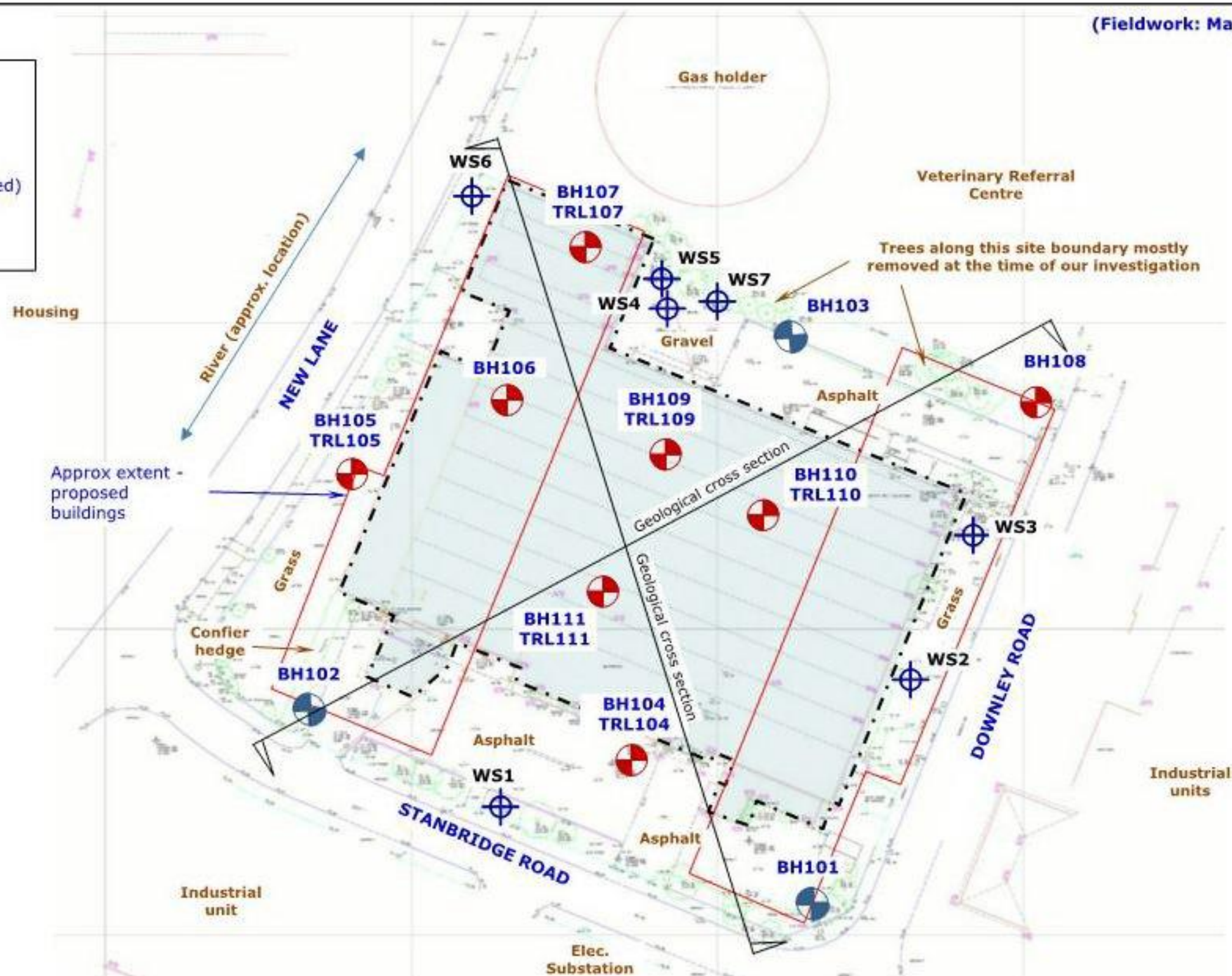
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3. PROJECT LOCATION	4. PROJECT DATE
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95. PROJECT DRAWING SCALE	96. PROJECT DRAWING STATUS
97. PROJECT DRAWING DESCRIPTION	98. PROJECT DRAWING COMMENTS
99. PROJECT DRAWING DATE	100. PROJECT DRAWING STATUS

Site Plan

(Fieldwork: May 2019)

KEY

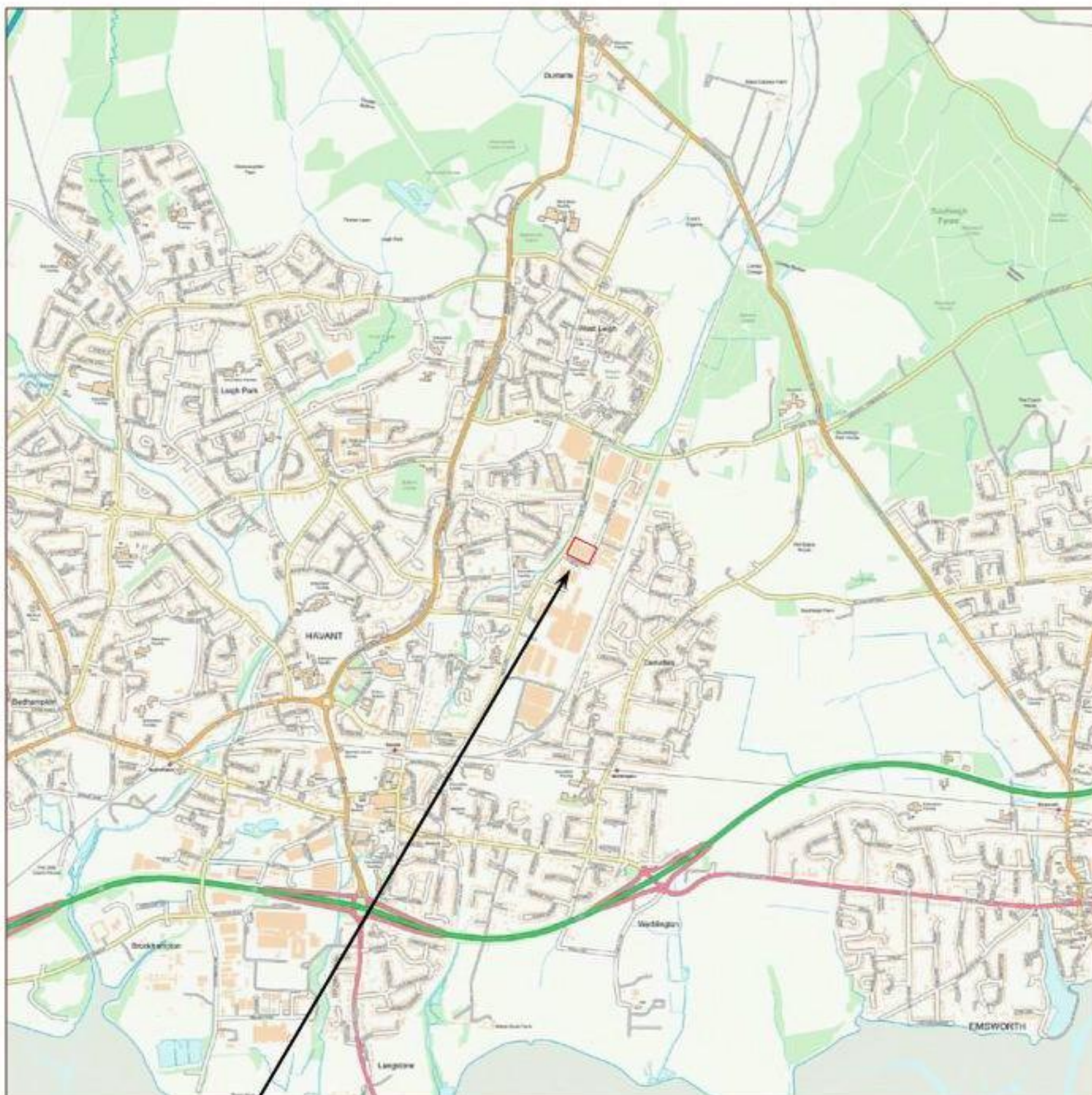
-  Rotary auger borehole
-  Dynamic sample borehole (with TRL CBR test where indicated)
-  Structural Soils 2019 - Dynamic sample borehole



0 50m

Scale = 1:1000@A4

Location Map



SITE LOCATION

(Contains Ordnance Survey data © Crown copyright and database right 2019)



APPENDIX B

Phase 1 Environmental Site Assessment, Butterick Group Ltd, 38 New Lane, Havant PO9 2ND; Vertex Group Inc, Project No. 41682, 11 October 2016

Transmittal



TO: Mr. William Kiesling
COMPANY: CSS Industries, Inc.
ADDRESS: Interchange Corporate, 450 Plymouth Road, Suite 300, Plymouth, PA 19462
PHONE/EMAIL: William.Kiesling@CSSIndustries.com
FAX #: 610-729-3958

FROM: Mr. Dave Cleary
PHONE/EMAIL: Dave.Cleary@Terracon.com
DATE: October 12, 2016

REGARDING: Butterick Group Ltd.
TERRACON PROJECT #: 13167095

WE ARE: ☐ Forwarding ☐ Returning
THE FOLLOWING: ☒ Final Report(s) ☐ Correspondence

ITEMS ATTACHED ARE:

Copies	Date	Description
PDF	10/11/16	Phase I Environmental Site Assessment

☒ For your use/info/files ☐ For your review ☐ For your approval
☐ Per your request ☐ URGENT

HARD COPY WILL FOLLOW BY: ☐ U.S. Mail ☐ FedEx ☒ E-mail

REMARKS:

Please notify me at once if enclosures are not received as listed above.

Terracon Consultants, Inc. 3105 Capital Way, Ste. 5 Cedar Falls, Iowa 50613
P (319) 277 4016 F (319) 277 4320 terracon.com

Environmental ■ Facilities ■ Geotechnical ■ Materials

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PHASE I ENVIRONMENTAL SITE ASSESSMENT



VERTEX®

**Butterick Group Ltd
38 New Lane
Havant
PO9 2ND, UK**

Prepared For:

Terracon
3105 Capital Way, Suite 5
Cedar Falls, IA 50613
Attn: Dave Cleary

Prepared By:

The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, MA 02189
781-952-6000

VERTEX Project No: 41682

October 11, 2016



The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, MA 02189
PHONE 781.952.6000 | FAX 781.335.3543
www.vertexeng.com

October 11, 2016

Terracon
3105 Capital Way, Suite 5
Cedar Falls, IA 50613
Attn: Dave Cleary

RE: Phase I Environmental Site Assessment
Butterick Group Ltd
38 New Lane
Havant, PO9 2ND, UK
VERTEX Project No. 41682

Dear Mr. Cleary:

The Vertex Companies, Inc. (VERTEX) is pleased to submit this Phase I Environmental Site Assessment (ESA) report for the above referenced property (the site). The purpose of this assessment was to identify Recognized Environmental Conditions (RECs) in connection with the site. A REC is defined as the presence or likely presence of hazardous substances or petroleum products in, on, or at a property; (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." It does not include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

Our work was conducted in general conformance with proposal P.1838.16 Rev1, executed by Mr. John B. Sallman on September 20, 2016, and in accordance with the general provisions of the E 1527-13 ASTM International document entitled "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" for commercial real estate, as practicable in the UK. To the best of our knowledge, this Phase I ESA report is true and accurate.

VERTEX also assessed the site for the potential presence of asbestos-containing materials (ACM), lead-based paint, and radon.



Please do not hesitate to contact us at your convenience should you have any questions or comments regarding this report or our recommendations. It has been a pleasure working with you on this project.

Sincerely,

The Vertex Companies, Inc.



William Nitch-Smith
Project Manager



Paul R. Morin, PG
Vice President

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FIGURES

Figure 1	Site Location Map
Figure 2	Site Context Plan
Figure 3	Site Layout Plan

APPENDICES

Appendix A:	Photographic Documentation
Appendix B:	EnviroCheck Environmental Database Report
Appendix C:	Historical Maps
Appendix D:	Resumes of Environmental Professionals

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Butterick Co. Ltd
38 New Lane, Havant, Hampshire, PO9 2ND
UK
VERTEX Project. No. 41682

1.0 SUMMARY

On September 20, 2016, The Vertex Companies, Inc. (VERTEX) was contracted by Mr. John B. Sallman of Terracon Consultants to conduct a Phase I Environmental Site Assessment (ESA) of the Butterick Co. Ltd. (Butterick) facility located in Havant UK (the site).

The site is located on 38 New Lane, Havant in a mixed residential and commercial/industrial area. The site covers an area of approximately 2.5 acres. Butterick Co. Ltd is a manufacturer of sewing patterns. The site comprises one building divided into several units. Butterick Co. Ltd occupies approximately 15% of the site and uses the site for storage and distribution of its sewing patterns and undertakes credit control, sales and marketing from offices on site. The remaining units are leased to a variety of businesses. According to information provided by site management, the land is owned by the Butterick Group Ltd. The purpose of this assessment was to identify Recognized Environmental Conditions (RECs) in connection with the site.

Findings

- Based on our review of readily available historical information, the site remained agricultural land until sometime between 1955 and 1960. It is understood that Butterick purchased the land in 1955. The historical maps first show a building on site in 1960. In subsequent years the site extended and largely remained with the same layout until the present day. It is understood that the Butterick historically printed the sewing patterns at the site, although operations ceased approximately 30 years ago.
- There are no records of intrusive investigations having been undertaken at the site.

- The site is located in an area comprising residential and industrial/commercial properties. The surrounding site area historically comprised agricultural fields, with the development of factories and residential properties from approximately 1960 onwards. A gas holder located directly north of the site first appeared in the 1960 map and is still present today. It is understood that the gas holder ceased functioning approximately three to four years ago. The industrial uses of the immediate site area, in particular the gas holder, have the potential to have resulted in significant subsurface and groundwater contamination. It is unknown if intrusive investigations have been undertaken in the surrounding areas.
- The site is bound to the north, south and east by industrial/commercial properties and to the west by residential properties. Regulatory databases for the identification of past and present on- and offsite uses are not available in The UK. As such, VERTEX conducted a limited review of available sources through the Envirocheck Report. The potential for contamination associated with the gas holder, located directly north of the site, is identified as a REC.

Additional Services

In accordance with the proposed scope of work, VERTEX conducted additional services as discussed in Section 9.0 of this report, including the assessment of asbestos-containing materials (ACMs), lead-based paint (LBP), and radon, which revealed:

- There are asbestos containing materials (ACMs) at the site, but these are recorded and managed using an asbestos register.
- Given the age of the building, there is the potential for lead-based paint to have been used within the building.
- Radon levels in the local area are low and protection measures are not required.

Conclusions

VERTEX has performed a Phase I ESA, aligned with the scope and limitations of ASTM E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, to the extent possible in the UK, of Butterick Co. Ltd, 38 New Lane, Havant, PO9 2ND, UK. Exceptions to, or deletions from, this practice are described in Section 8.0 of this report. This assessment has revealed the following evidence of current recognized environmental conditions (RECs) in connection with the site.

- The known historical use of the site as a printing works is considered to be a REC.
- Additionally, the industrial uses of the immediate site area, in particular the former gas holder located directly north of the site have the potential to have resulted in ground and groundwater contamination.

Although the above RECs present the potential for there to be contamination of soil and groundwater at or in the vicinity of the site, there is no evidence of actual contamination; furthermore there is no known regulatory or third party action in relation to contaminated land at or in the vicinity of the site. In relation to the off-site sources, it is noted that, under UK contaminated land law, liability for any such contamination would be held, in the first instance, by the original polluter and/or the owner of the land on which the contamination originated, rather than sites (such as the subject site) impacted by any such contamination.

Based on the use of the site and so long as the site use remains the same, assessment of the ground and groundwater conditions is not considered necessary at this stage.

2.0 SITE AND VICINITY CHARACTERISTICS

2.1 Site Description

The site is located on New Lane, in a mixed industrial and residential area in Havant. The site covers an area of approximately 2.5 acres. A location plan can be found in Figure 1.

The site is and its surrounding area are topographically flat. A plan showing the local area is included as Figure 2.

The majority of the site (approximately 80%) is covered in asphalt or concrete with soft landscaped (grassed) area on the western and eastern parts of the site.

2.2 Site Improvements

The site consists of one large brick/block built building with plasterboard walls divided into separate units which occupies the majority of the site. The roof of the building comprises a mix of corrugated metal and metal framework with skylight frames. It is understood that the land was purchased around 1955 and the building constructed at some point between 1955 and 1960. Based on the site visit, it would appear that in subsequent years extensions were added to the building including a second floor located on the south-western portion of the site.

The whole site is owned by the Butterick, however, the majority of the units are leased to various businesses or leased for storage and Butterick- occupies approximately 15% of the premises.

There are parking areas located on the southern and northern portions of the site and these occupy approximately 25% of the site area. In the south-eastern part of the Site, there were two storage containers, two boats and a trailer present in the car park at the time of the site visit.

For a layout of the site, please refer to Figure 3 – Schematic. Photographic documentation of the site and surrounding areas is presented in Appendix A.

2.3 Site Operations

The site is divided into units which are occupied by many different businesses. The businesses operating at the site are presented in the following table. Please note access to all units was not possible.

PROPERTY USE SUMMARY		
NAME OF BUSINESS	TYPE OF BUSINESS	LOCATION
Butterick	Sewing patterns. Site used for storage and distribution of sewing patterns (order fulfilment), sales and marketing, credit control.	Western part of building
Igloo Pets	Pet supplies.	North-eastern corner of building
Belcher Frost (Solicitors)	Archive storage.	Central part of building
Southern Energy Training Academy	Training center for gas, plumbing and electrical industry.	Northern part of building
EasyTurn	Manufacturers of car turntables.	Northern part of building
Hampshire Signs and Plastics	Manufacturers of signs and plastics.	Central part of building
Safety Belt Solutions	Manufacturer of occupant restraint systems.	Eastern part of building
PenCol Electrical Ltd	Electrical engineers.	Southern part of building
Hunter Simmons	Accountants.	First floor of south-western building
Diamond Distribution Company South	Lighting specialists.	Southern part of building
The Fixed Bicycle Company	Bike shop.	Southern part of building
Rio Trade Services Ltd	Unit used for personal storage.	South-eastern part of building
Quantel/Snell Ltd	Testing of digital production equipment for television.	Eastern part of building
Chris Goldring	Woodwork workshops and furniture storage.	South-eastern part building
Morris Crocker (Accountants)	Archive storage.	South-western part of building

In addition to the above, a number of the units were also used for general storage and two units were used for the storage of slot machines.

It is understood that historically the site was fully occupied by Butterick and that the site printed the sewing patterns, however this ceased approximately 30 years ago and printing operations

were moved to the US. It is also understood that the company produces a magazine issued 10 times per year, however printing of the magazine is not undertaken on site. Butterick started to lease parts of the Site sometime in the late 1980s/early 1990s.

It is assumed that chemicals used for printing would have been stored on site, although how they were stored is unknown; it is understood that currently in the US, where the printing is now undertaken, the chemicals used are stored in small containers. It is understood that the printing process would have involved three to four different machines and would have been divided as follows:

- Printing of the sewing pattern on tissue paper;
- Printing of the instructions;
- Printing of the envelope for sewing pattern and instructions;
- Potentially a machine for putting pattern and instructions into the envelope.

2.4 Current Uses of Adjoining Properties

The Site was observed to be located in a mixed residential and industrial/commercial area. Adjoining properties were observed (from the site or from public access areas) for signs of RECs and their potential to pose an environmental concern to the site. The uses and features of adjoining properties are described in the following table.

NEARBY/ADJOINING PROPERTY SUMMARY		
DIRECTION	PROPERTY USE	CONCERNS
North	A former gas holder and associated buildings. It is understood from site personnel that the gas holder and site has not been used in the last 3 to 4 years. During the site visit it was observed that the gas holder site was locked and appeared to not be in use, although there were signs that the site may currently be used for storage. Adjacent to the east of the gas holder and also north of the site there is specialist veterinary clinic. Further north of the site there was a road surface/civil engineering company and a plant hire company.	Potential contamination from former gas holder
East	Directly to the east of the site is Downley Road and beyond that there is a small industrial estate (The Oakwood Centre), a taxi company (Andicars Ltd), a sheet metal company (Havant Sheet Metal), a cable connector manufacturers (Gigatronix).	Potential contamination from manufacturing processes

NEARBY/ADJOINING PROPERTY SUMMARY		
DIRECTION	PROPERTY USE	CONCERNS
South	Directly to the south is Stanbridge Road and beyond that is a CCTV manufacturer and trade supplier (QVIS).	Potential contamination from manufacturing processes
West	Directly to the west is New Lane and beyond that is residential development.	None

2.5 Physical Setting Source(s)

Physical setting sources specified in Section 13.0 of this report were reviewed to provide information about the geology and hydrogeology of the site. An Envirocheck Environmental Database Report was commissioned to provide the physical setting and environmental regulatory listings information.

2.5.1 Topography

During the site visit, the site and surrounding area was generally topographically flat. According to topographic data from Google Earth, the surface of the site is approximately 15 to 21m above mean sea level (amsl) indicating that the site slopes from the north to south.

2.5.2 Surface Water

No surface water features were identified on the site. However, based on available mapping and the Envirocheck Database there is a surface water feature located approximately 19m northwest of the site. This appears likely to be a surface water drain based on maps of the area. The nearest significant surface water feature is Bridge Lake located at its closest point over 2km south of the site.

2.5.3 Geologic Conditions

Published records (British Geological Survey (BGS)) for the area indicated the geology of the site to be characterized by the succession recorded in Table 2.

GEOLOGY AT THE SITE		
GEOLOGICAL UNIT	DESCRIPTION	ESTIMATED THICKNESS (M)
Superficial geology	Approximately a third of the site (eastern part) is recorded to be underlain by undifferentiated River Terrace Deposits comprising sand, silt and clay. The western two thirds of the site is recorded to be underlain by Head Deposits comprising gravely clay.	Unknown, however anticipated to be several meters
Bedrock	The whole site is recorded to be underlain by the London Clay Formation comprising clay, silt and sand.	Unknown

Source: Geology dataset from the British Geological Survey (BGS).

There are no recorded BGS boreholes within the site boundary, however, there are two within close proximity to the site boundary. Both boreholes identified within close proximity to the site boundary were shallow (1m and 3m).

The borehole referenced SU70NW173, is a borehole drilled to a depth of 1m. The borehole identifies the following stratigraphy:

- 1.07m thickness of very compact flint cobbles and medium gravel.

The borehole referenced SU70NW174, is a borehole drilled to a depth of 3m. The borehole identifies the following stratigraphy:

- 1.07m thickness of potential Made Ground described as friable brown sandy organic clay.
- Underlying the potential Made Ground is compact flint and cobbles with medium gravel and dark brown sandy clay which extends to the base of the borehole at 3m.
- Groundwater entry was noted at the base of the borehole, although no standing water was recorded following the drilling.

2.5.4 Groundwater

Based on surface topography, and proximity of the coast, it is assumed that groundwater would flow towards the coast to the south. Actual local groundwater flow direction can be influenced by factors such as local surface topography, underground structures, seasonal fluctuations, soil and bedrock geology, and production wells, none of which were considered during this study. Information available on the EA website indicates that the site lies within a currently designated groundwater SPZ (inner zone – subsurface activity only).

3.0 USER-PROVIDED INFORMATION

VERTEX requested the following information about the site from Terracon/Butterick ("User"):

- An evaluation of the presence of environmental cleanup liens for the site;
- Activity and use limitations (AULs) such as engineering controls (e.g., slurry walls, caps) and land use restrictions or institutional controls (e.g., deed restrictions, covenants) that may be in place for the site;
- Specialized knowledge that includes personal knowledge or experience related to the site or nearby properties based on professional experience or knowledge of the site;
- Fair market value (FMV) to evaluate whether the purchase price of any parcel was significantly below FMV;
- Obvious indicators that involve past or present spills, stains, releases, cleanups on or near the site;
- Common knowledge about use of specific chemicals, possible contamination, or past use of the site and surrounding area.

The information has been provided by Butterick Company Limited and is summarized as follows:

- No environmental liens have been filed or recorded against the property;
- No AULs are in place for the site;
- No specialized knowledge or experience related to the site or nearby properties;
- No actual knowledge of a lower purchase price because contamination is known or believed to be present at the site;
- No obvious indicators that involve past or present spills, stains, releases, cleanups on site;
- No obvious indicators that point to the presence or likely presence of contamination at the site.

4.0 INTERVIEWS

VERTEX conducted an interview regarding site history and the current on-site operations with the following individuals:

INTERVIEWS		
NAME/ COMPANY	TITLE/POSITION	INFORMATION PROVIDED
Ms. Sue Haft	Managing Director of Butterick	Provided information regarding site history and operations.
Mr. Peter Exton	Logistics Manager	Provided information regarding site history and operations.

Information obtained from this interview is discussed in relevant sections of this report.

No representatives of authorities were interviewed for this assessment. Publically available data is provided within the Envirocheck data report in Appendix B. Additional enquiries can be made of the local regulatory authorities. However, these inquiries must be made in writing with a subsequent consultation period. The timeframe for this Phase I did not allow for this written correspondence with the regulators.

5.0 HISTORICAL RECORDS REVIEW

Past land uses for the site and adjoining properties were assessed to identify historical practices or conditions that may have impacted the site. The history of the land-use and development of the site and surrounding area has been assessed based on historical maps. Copies of Ordinance Survey (OS) and County Series maps are included in Appendix C. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

5.1 Historical Site Use Summary

Based on our review of readily available historical information, the site remained agricultural land until 1960. It is understood that the land was purchased in 1955 by Butterick and sometime between 1955 and 1960 the building was constructed. It is understood that the site formerly printed sewing patterns, however this ceased approximately 30 years ago and Butterick now leases the majority of the site to other businesses and occupies only approximately 15% of the site themselves; Butterick occupied areas are used for storage and distribution of sewing patterns and where marketing, sales and credit control operations are run from.

5.2 Historical Adjoining Properties Use Summary

The site is located in an area comprising residential and industrial properties. Review of historical information has revealed that the surrounding area has been used for largely agricultural use since the earliest available map dated 1867. The surrounding area became developed in the 1960s with the presence of both residential and industrial properties including factories and a gas works. There has been a railway line running north-east to south-west approximately 90m east of the site since at least 1870. Directly north of the site there is a gas holder which has been present since at least 1960. Information from site personnel interviewed that the gas holder stopped being used approximately 3 to four years ago, although the structure is still present on the adjacent site.

5.3 Prior Ownership

It is unknown who owned the land prior to Butterick's purchase of the site. Interviews with site personnel indicated that in 2001 Butterick was acquired by McCall, but continue to operate at the site as Butterick.

5.4 City Directories

City directory coverage is not available for the site area. However, trade directory entries for the site are provided in the Envirocheck Environmental Database report; those entries reported with industrial uses are summarized in Section 6.5 of this report.

5.5 Aerial Photography

Historical aerial photography was reviewed from Google Earth. Due to copyright restrictions, these photographs could not be reproduced in the final report. Please refer to the table below for a summary of historical aerial photographs.

AERIAL PHOTOGRAPHY REVIEW			
YEAR	SUMMARY (ON-SITE)	SUMMARY (OFF-SITE)	CONCERNS
1999	The majority of the site is occupied by a large building. With the southern portion of the site and some of the northern part of the site covered in hard standing and grassed areas located on the western and eastern part of the site. The site is in the current configuration.	The site area appears to largely comprise a mix of residential and industrial/commercial buildings. There is a gas holder north of the site and a railway line east of the site.	Potentially contaminative off-site land use
2001, 2004, 2005, 2007, 2011, 2015	No significant changes.	No significant changes.	None

The review of historical aerial photographs did not identify specific concerns or RECs for the site, however, off-site there are a number of operations including the presence of a gas holder, factories and railway line which may be of concern for the site.

5.6 Historical Maps

Copies of Ordinance Survey (OS) and County Series maps are included in Appendix C. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

HISTORICAL MAP REVIEW			
YEAR	SUMMARY (ON-SITE)	SUMMARY (OFF-SITE)	CONCERNS
1860s	Agricultural land	Largely agricultural. A railway line running north-east to south-west approximately 90m east of the site. Gravel pit located approximately 300m west of the site.	Potentially contaminative offsite land use – but unlikely to impact site
1870s	No change	No significant changes	None
1890s	No change	Gravel pit now labelled as old gravel pit. There is some development approximately 420m south-east of the site. Development approximately 600m south of the site.	Potentially contaminative offsite land use – but unlikely to impact site
1900s	No change	No significant changes	None
1910s	No change	No significant changes	None
1930s	No change	No significant changes	None
1940s	No change	No significant changes	None
1950s	No change	No significant changes	None
1960	Factory building occupying approximately a third of the site.	Several factory buildings west and south of the site. A gas holder and building directly north of the site and residential development to the west of the site.	Potentially contaminative onsite and offsite land use
1963 - 1966	No change	No significant changes	None
1969 - 1973	Factory building has expanded and occupies the majority of the site. There appears to be two structures along the southern boundary of the site.	No significant changes	Potentially contaminative onsite land use
1975	No change	Further development in the surrounding area, both residential and industrial including works located approximately 450m and 540m north of the site.	Potentially contaminative offsite land use
1978 - 1991	No change	No significant changes	None

HISTORICAL MAP REVIEW			
YEAR	SUMMARY (ON-SITE)	SUMMARY (OFF-SITE)	CONCERNS
1992-1993	No significant change.	No significant changes	None
2000	No change	No significant changes	None
2016	Structures along the southern boundary no longer appear to be present.	No significant changes	Potentially contaminative onsite land use

The review of historical maps identified areas of concern associated with the presence of a factory building on site and factories and works in the surrounding area including a gas holder located directly north of the site. Gas holders would typically have contained town gas and, later, natural gas; small-scale town gas generation also often occurred at gas holder sites. Contaminants of concern at this type of facility are typically associated with gas sludges, and could include hydrocarbons, particularly polycyclic aromatic hydrocarbons (PAHs), cyanides and heavy metals.

6.0 REGULATORY RECORDS REVIEW

An Envirocheck Data Report was commissioned to provide the physical setting and environmental regulatory listings information.

6.1 Sensitive Land Uses

The site is located within a nitrate vulnerable zone (NVZ), a second NVZ is located 329m east of the site; NVZs are areas that are sensitive to nitrate-based contamination (such as from agriculture, waste water sludges, etc.). The closest environmentally designated area is an ancient woodland (ancient and semi-natural woodland) located 709m north-east of the site.

6.2 Coal Mining

The Envirocheck database report indicates that the site is not in a coal mining affected area.

6.3 Ground Stability Hazards

Evidence has been sought to identify any potential ground stability hazards on or in the immediate vicinity of the site. The ground stability hazards identified on site are summarized in Table 3.

HAZARD	HAZARD POTENTIAL ON SITE
Collapsible Ground	Low hazard for south-eastern part of site. Very Low hazard for eastern part of site
Compressible Ground	No Hazard assigned for eastern part of site
Ground Dissolution	No Hazard assigned to eastern part of site
Landslide	Very low hazard for eastern part of site
Running Sand	No Hazard assigned for eastern part of site Low hazard for the south-eastern part of site Very Low hazard for northwestern part of site
Shrinking or Swelling Clay	Low hazard for the eastern part of site

6.4 Landfilling and Land Reclamation

Historical

There are no historical landfills located within 500m of the site.

Current

There are no current registered licensed landfills within 500m of the site. There is one licensed waste management facility located within 500m of the site which was categorized as 'In-house Storage Facilities' and one registered waste transfer site within 500m of the site which authorized 'special waste and other waste in working plan', with no further information provided.

6.5 Potentially Contaminative Industries

There are 47 industrial facilities within 250m of the site, which would have the potential to present a contaminated land risk. Those located within 100m of the site and are still active are detailed in the table below.

POTENTIALLY CONTAMINANTIVE INDUSTRIAL FACILITIES			
GRID REFERENCE	APPROXIMATE DISTANCE AND ORIENTATION FROM SITE	ACTIVITY	CONCERNS
472624, 107496	Onsite/ Formaplex	Machine Tools Manufacturers and Distributors	None – no longer present onsite
472625, 107533	Onsite/ McCall Butterick – Vogue Co Ltd	Pattern Makers – Industrial	None – units used as offices and for storage/ distribution
472625, 107533	Onsite/ Hampshire Signs & Plastics	Sign Manufacture	None – no concerns observed during visit
472624, 107496	Onsite / Park Life Ltd	Cycle Accessories, Manufacturers and Wholesalers	None – no longer present onsite
472610, 107549	Onsite / Pencol Electrical Services	Electrical Engineers	None – units used as offices
472757, 107511	58m east of site / Havant Sheet Metal	Sheet Metal Work	None – anticipated low level oil storage and solvent use only
472769, 107557	68m east of site / Monolution 3d Machining	Precision Engineers	None – anticipated low level oil storage and solvent use only
472754, 107450	79m south-east of site / Fluid Power Components Ltd	Pneumatic Systems & Equipment	None – anticipated low level oil storage and solvent use only

Other potentially contaminative industrial facilities in the surrounding area include printers, printed circuit manufacturers, mechanical engineers, air conditioning and refrigeration contractors and electronic equipment manufacturers and assemblers.

While these land uses have the potential to cause contamination, the sizes of the facilities and their low anticipated amounts of contaminative products use reduces the level of concern. Details of these industries and others are included in the environmental database in Appendix B.

6.6 Pollution Incidents to Controlled Waters

There are two Environment Agency (EA) recorded pollution incidents to controlled waters within 500m of the site. These pollution incidents are detailed in the table below.

POLLUTION INCIDENTS		
DATE	APPROXIMATE DISTANCE AND ORIENTATION FROM SITE	COMMENT
10/07/1992	285m to the west	Oils – Petrol Minor water impact (Category 3)
13/06/1995	417m to the south-west	Unknown Sewage Minor water impact (Category 3)

6.7 Surface Water Abstractions

There are no recorded surface water abstractions located within 2,000m of the site.

6.8 Groundwater Abstractions

There is one recorded groundwater abstraction located within 2,000m of the site. This is summarized in the following table (the Envirocheck database reports notes that there are three, however on inspection the license numbers are all the same and in the same location).

GROUNDWATER ABSTRACTIONS		
LICENCE NUMBER	APPROXIMATE DISTANCE AND ORIENTATION FROM SITE	COMMENT
11/42/36.2/1	1,913m to the south-west	Public Water Supply: Potable Water Supply - Direct

6.8 License and Permissions Listings

Based on information from the Envirocheck data and interviews on-site, there are no registered licenses or permissions associated with the site.

There are five Integrated Pollution Controls (IPC) located within 500m of the site, although three have been revoked. The current IPCs are summarized in the following table.

INTEGRATED POLLUTION CONTROLS		
PERMIT REFERENCE	APPROXIMATE DISTANCE AND ORIENTATION FROM SITE	DESCRIPTION
AO0598	449m to the south-west	4.5 A (F) Inorganic Chemical processes within the Chemical Industry
BC9461	454m to the south-west	4.5 A (F) Inorganic Chemical processes within the Chemical Industry

There are six Integrated Pollution Prevention And Controls (IPPC) located within 500m of the site although two are surrendered and a few are under the same permit number. The current IPPCs are summarized in the following table.

INTEGRATED POLLUTION AND PREVENTION CONTROL		
PERMIT REFERENCE	APPROXIMATE DISTANCE AND ORIENTATION FROM SITE	DESCRIPTION
Bx8076ix	449m to the south-west	Inorganic Chemicals; Using Etc of Antimony Etc (Unless Otherwise Prescribed) (Unless Glazing Etc) – Asahi Thrmofil UK Ltd and then Sumika Polymer Compounds (UK) Ltd

There is one Local Authority IPC located within 500m of the site. This is summarized in the following table.